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THE

ENCYCLOPEDIA OF HEALTH

VOLUME VI

NATURAL CURATIVE METHODS

Foreword by the Editor

IT IS the duty and privilege of every intelligent individual to acquire sufficient knowledge of health to protect himself and his family in the physical emergencies which occasionally attack even the most vigorous individuals of the human race.

To the ailing person, disease seems profoundly mysterious, and when the possibility of death faces us it is often terrifying. We are ready to turn to anyone who will offer help of any sort. But often, in our fear and ignorance, we are unable to judge what is really helpful. This is one of the difficulties which progressive doctors constantly encounter. The patients who come to them usually expect medicine. Many doctors, who have learned to feel that other factors are more important than drugs in maintaining and recovering health, find their patients' ills vanishing one by one when they sit down and talk frankly and honestly with them about their complaints, or find that such a heart-to-heart talk is the beginning of a progressive healthward climb by their patients without drugs and medicines being required.

THE BODY A SELF-REGULATING MACHINE.—Few people understand that the ill body, regardless of what treatment may be taken, must be depended upon to cure itself. The most that any physician can do is to aid in bringing about conditions which will enable the body to cure itself. The most dependable way to determine the so-called curative treatment of any disease is to learn its cause.

Disease Not Mysterious

No one knows exactly what a feeling of discomfort or pain may indicate. Sometimes it may be a dangerous symptom; but often it indicates a condition, whether seemingly serious or merely disconcerting in nature, easily corrected in most instances by right living.

If you fear an enemy his power over you is greatly increased. It is the same with disease. If you allow fear to get

the better of you when you experience the symptoms of disease, its effects upon you are far more serious.

The body at all times is working for itself. It is self-regulating, hence its failures are mostly due to errors for which we, personally, are responsible. Serious diseases are frequently made worse because of the unnatural, hence interfering, treatments administered.

THE NATURE OF DISEASE.—Faith in the magic of drugs is due to general ignorance of the real nature of disease. Once one begins to understand what sickness really is, one has a means of meeting most of the usual ailments when they occur, and of protecting the body against their recurrence.

Symptoms and sickness are the result of abnormal bodily conditions due to failure to obey the laws of life and health. Sickness then intervenes as a physical remonstrance. It brings about compulsory arrest of digestion. It stops the overloading process. The body can then eliminate the impurities which, if they continued to accumulate, finally would cause death. The ending of sickness in premature death is due almost invariably to the ignoring of the signals given by nature to stop over-feeding and other disease-producing practices.

Nature's Danger Signals

Sickness really may be looked upon as a means which the body adopts to remedy abnormalities within itself. When the exact status of sickness is recognized, when it is properly treated, and the body is assisted in the eliminating, purifying and really curative processes, recovery usually is rapid and certain.

The right procedure for everyone possessing health-intelligence is to be able to recognize sickness before it appears, to see it far ahead. If one will study his physical welfare sufficiently to be able to recognize its coming, illness, in most of its serious phases, can be avoided.

The ability to see the disease before it actually gets the upper hand is invaluable. It saves an incalculable amount of suffering, since it enables one to depend upon himself in practically every emergency. There is no need to reckon on the burden of sickness—you are able to circumvent it.

Remember, therefore: If you lose your appetite; if you feel dull, lazy, logy; if your bowels are inactive; if you are irritable; if your nerves are shaky; if you suffer from sleep-



PHOTOGRAPH UNDERWOOD & UNDERWOOD

Educational and health authorities recognize that health in great measure depends upon cleanliness and sanitation. These school children of Stockholm, Sweden, are each assigned a special bath and specified periods for its use.

lessness; if you have dizzy or fainting spells—if you have the slightest signs of such symptoms, then it is your duty to try to learn the cause of your trouble.

If the cause is due to overeating, fast for a few meals. Wait for a real appetite. If the cause is insufficient liquids, drink more water. If it is a diet too concentrated, add more salads, vegetables, whole grain cereals and other food that contains roughage or woody fiber. If it is a lack of exercise, begin to take long walks supplemented by indoor exercise for stimulating the vital regions.

Overeating and Ill Health

INSTINCT AND HEALTH.—Of course, it may be said that the average layman is not able to determine the cause of his ailment. The fact is that in many cases when people make mistakes about the nature of illness, the mistake is due not to ignorance but to scraps of half-digested knowledge. Perfect ignorance would probably leave the instincts a certain freedom to express themselves and to guide the body back to normal health. In primitive times when men lived more simply, instinct guided and protected them with more certainty than it

does now. This innate sense has been confused by modern environments and by the ready spread of opinions, misunderstood bits of fact, and the like. People suffer from half knowledge. The only cure for this condition is more knowledge.

Take, for example, the matter of eating when ill. The savage or the animal settles this simply. When he is ill, he does not feel like eating. He naturally fasts till unpleasant symptoms disappear and appetite returns. Civilized man would normally do the same. But he is confused by vague generalizations to the effect that food is the life of the body, that one must eat to gain strength, and so on. These statements are true, in a sense, but they are only half the truth.

When you are suffering from disease, fasting means feeding in a sense, because it gives rest to overworked organs and enables the entire organism to adjust itself more perfectly. When the stomach is given food after it has had a rest of this kind it receives and creates a superior quality of blood. The blood-making process begins in the stomach and, since it is by no means completed here, it continues throughout the small intestine. When the contents of these important organs are foul and putrescent the whole body is poisoned. If your habits of life are such that the body becomes overloaded with impurities, the time is sure to come when you must have a physical housecleaning.

Foreign Elements In the Body

There is a limit to the amount of foreign elements the body can harbor and still retain sufficient strength to go about its ordinary daily duties. When you feel sluggish, tired and lazy and work of any kind is an effort, you most likely are suffering from what might be termed the first symptoms of bodily poisoning. In such cases blood does not contain the elements essential to vital and vigorous life, or it contains such an excess of toxins or poisons as to neutralize the value of the needed elements.

If self-questioning gives you the usual reply that the trouble comes from your alimentary canal, then what is the first instruction to start you on the way to a cure?

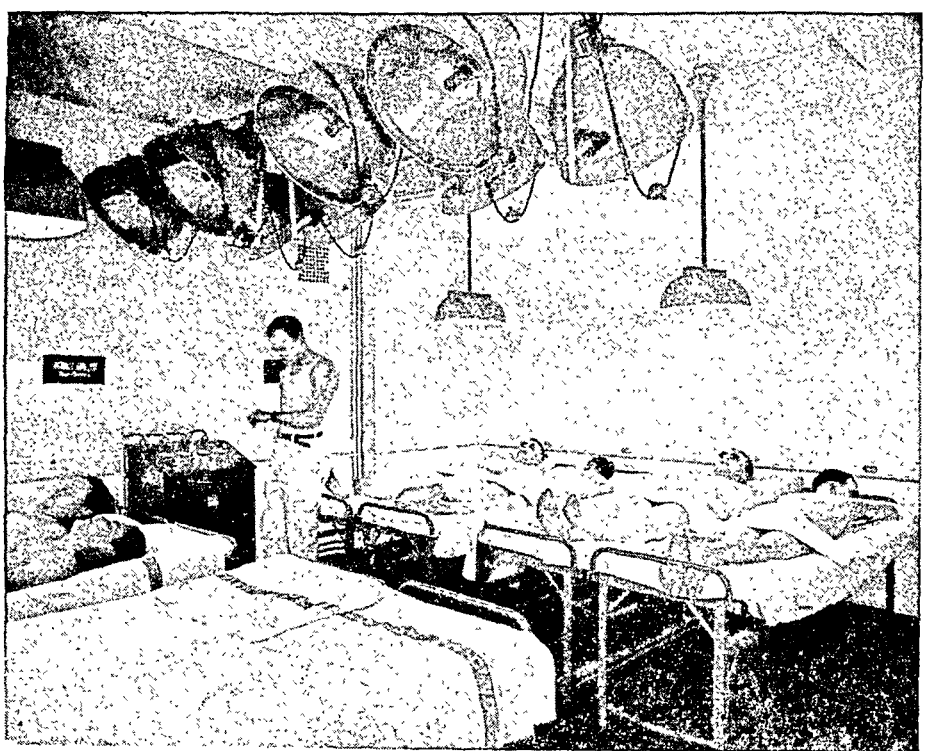
In most cases it would be rigorous abstinence from food, especially solid food. Generally fruit juices may be allowed, especially if acid fruits are craved.

In many cases of illness acid fruit helps to cleanse and antisepticize the alimentary canal. It especially cleanses the stomach, gives one a comfortable feeling, and encourages one to take more liquid.

Such a course, followed for a day or two, or longer in many instances, will prevent much serious illness. But while it may be considered a novel method of therapy, it is, as a matter of fact, just exactly what the majority of sick people would naturally do for themselves if they followed their own normal impulses.

Intelligent Self-Treatment

While no one will recommend that sick people try on themselves surgical operations, or difficult and complicated methods of cure which require special skill or judgment, many physicians themselves will admit that the patient is perfectly safe, and is probably doing himself a great deal of good, when he cooperates with the effort the body itself is making to



PHOTOGRAPH NATIONAL COUNCIL Y. M. C. A.

The natural powerful healing rays of the sun are available in temperate latitudes only in favorable seasons and hours. In this picture is shown scientifically controlled and directed sun lamp treatments. Dark glasses are worn by those facing the direct rays.

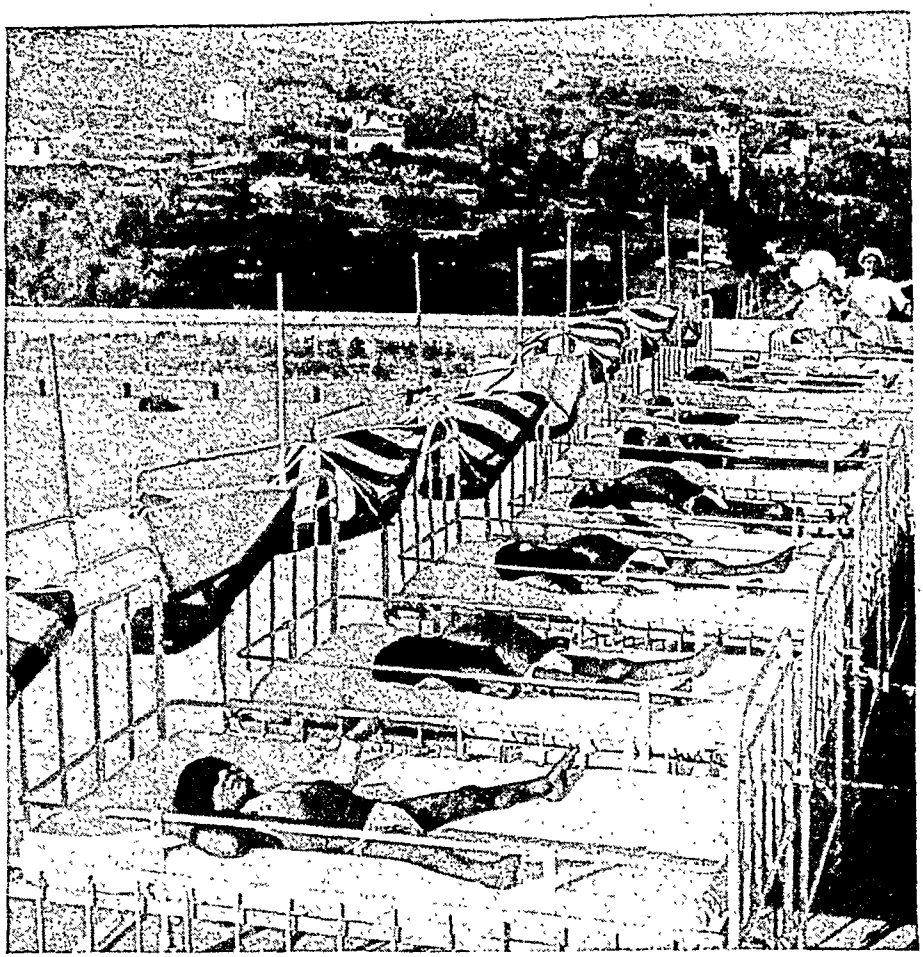
eliminate poisons. The methods of drugless healing suggested in this volume offer ways and means by which the great vitalizing forces of water, sunlight, electricity and other natural agents can be safely used to assist the body in its own effort to get well.

Some of the most distinguished physicians now appreciate to the fullest extent the power of the body to heal itself. They are preaching doctrines similar to those enunciated by us thirty years ago. They are advocating adherence to natural, physiological law. They do not commend doping methods that divert or drive inward the symptoms of disease. They believe in mildly stimulating the functions of the body, depending on the vital processes to remedy the symptoms associated with disease.

Progressive doctors change their methods year after year. They never really graduate. They remain students throughout their entire lives. They are learning every day, and their patients naturally secure the benefit of this vast storehouse of knowledge which they secure from a varied experience. The more experienced and learned a physician is the less rigid and conservative he is likely to be. He recognizes that the body is distinctly a self-regulating organism. The processes used by the physical organism in effecting a cure of any complaint are beyond detailed analysis. No physician yet can tell you much about the processes or about the workings of the physiological laboratory in which the body works out the problem of reclamation. Hence in offering these methods of drugless healing we are in nowise encroaching on the special province of the physician, or running contrary to the best doctors.

The Body's Healing Powers

First Aid for the Ill.—Frequently these books will fall into the hands of someone who is ill, who has not already heard of the general physical culture regimen, and who wishes specific advice about just what to do and where to begin to help himself. Even at the risk of repeating ourselves somewhat, we may say: "Begin with a fast, and with plenty of fresh air day and night. Cleanse the bowels with enemas, as suggested in this book, daily, and keep the skin perfectly clean, as suggested herein, beginning with friction rubs. Drink plenty of water. Experiment with rest in bed, or with exercises, as your condition seems to warrant." This gives you the basis of further cure. It can harm no one, whatever his disease may be,



PHOTOGRAPH UNDERWOOD & UNDERWOOD

In early, as in adult life, the most effective immunizing is best developed by sunshine in conjunction with other body-building measures. The children here shown are patients in an open-air hospital on the Riviera in Italy.

and is almost invariably helpful. Beyond that the individual can proceed carefully, using this volume in connection with the volumes on diet and exercise and the following two volumes, trying to understand his own case and to help himself to get well.

Germs and Antiseptics

FEARS AND PHOBIAS TO AVOID.—In connection with any curative routine, there are certain fears and superstitions to be avoided. Among these are:

Fear of Germs.—No one will deny that the things one eats or uses should be clean, both for esthetic reasons and reasons of health. But many people are unduly timorous about the germs of diseases that are said to lurk everywhere about us.

The fact is that the natural antiseptics of the body are found within the body itself. Germs cannot enter the unbroken skin. It is impermeable to them. The membraneous linings of all the body's cavities, if unbroken, are invulnerable to them. The normal secretions of these membranes are germicidal. There is no susceptibility on the part of any healthy organ to bacterial injury.

Health is the great immunizing agent, and health is maintained by proper food, pure water, fresh air, sunshine, exercise, rest, sleep and freedom from devitalizing habits. It is impaired by improper food, bad water, foul air, lack of sunshine, indolence, lack of rest and sleep and all devitalizing habits, dissipations and excesses.

The lesson is obvious: get and maintain health by the eternal elements of natural hygiene and you can laugh at all the germs in the universe.

Fear of Drafts.—Cast away fears of night air, cold air, damp air, wet feet and damp clothes. These groundless fears were inherited from our ignorant ancestors.

Groundless Fears of Exposure

"I shall not attempt to explain," wrote Benjamin Franklin, "why 'damp clothes' occasion colds rather than wet ones, because I doubt the fact. I imagine that neither the one nor the other contributes to this effect, and that the causes of colds are totally independent of wet or even of cold."

The fisherman's boy who paddles around in the surf or sits barefooted in a wet canoe or bare-headed on the windward cliffs is not the one who suffers from these afflictions. Rather, the one who suffers most is the housebound child, deprived of fresh air, kept overheated and never permitted to get his feet wet or his clothes damp.

Benjamin Franklin proposed to prevent colds and even smallpox by air baths and found that a few minutes of exposure to the air would quickly relieve insomnia. "I rise almost every morning," he says, "and sit in my chamber without any clothes whatever, half an hour or an hour, according to the season, either writing or reading. This practice is not the least painful, but on the contrary agreeable, and if I return to bed afterward, before I dress myself, I make a supplement to my night's rest of one or two hours of the most pleasant sleep that can be imagined."

Hardy habits have an invigorating effect on the constitution. Effeminacy defeats its own end and subjects its slaves to sufferings unknown to the sons of the wilds. The plant that grows outdoors is hardy and strong; the hothouse plant lacks hardihood and constitutional strength.

The sick or overcoddled person will find in these volumes specific descriptions of the procedure by which he may accustom himself to face and rejoice in the life-giving powers of the elements.

USE OF STIMULANTS.—The use of stimulants is a false and cheating way of getting that psychological exhilaration which should be normal to the healthy person. The so-called exhilaration is a process of expenditure. A stimulant is a substance which causes the body to expend the power it possesses but which does not supply any of the power expended.

We are conscious of power only in its expenditure. Stimulants waste the power they appear to give. The harm they do is precisely in proportion to the good they appear to do. The more they appear to strengthen the more they actually weaken. The depressing after-effect is the result of the expenditure of the bodily energy and substance. The period of depression is a period of decreased activity during which less energy is expended. It is a period of rest during which some measure of repair and recuperation take place.

After Effects of Stimulants



PHOTOGRAPH SISTER ELIZABETH KENNY FOUNDATION, NEW YORK

Simple yet effective methods for conquering disease and deformity have been successfully carried out by Sister Elizabeth Kenny who is shown in the illustration above holding a victim of the dread polio disease.

The longer the period of stimulation lasts the longer must the necessary after-period of depression be. The more intense the stimulation, the more profound must be the depression. This is true whether the stimulation is of one organ or of the whole body. It may be digitalis for the heart or brandy for the general organism—the depressing after-effect is inevitable in both cases.

The use of stimulants to create the natural exhilaration which should belong to the healthy person at all times is a losing game. More and more stimulants will be required for less and less effect. At best the excitement and release—the self-expansion, the illusion—are poor imitations of the normal excitement and emotional release of perfect health. The blues, the sense of inferiority, the feeling that there just isn't anything in life, the inability to open up and talk and have a good time till one is artificially stimulated—all these are symptoms of something else wrong with the physique and the whole personality.

Constipation

It is no use to deaden the symptoms. The thing to do is to go after the cause and to cure it. Usually it will yield to a simple routine of improved diet, and less of it, more water, exercise, internal and external cleanliness. Unless the habit of using some stimulant is deeply fixed, the improvement of health under such a regimen will do away with the taste for it, and even make stimulants obnoxious.

Use of Cathartics.—Constipation dulls the brain and lowers the vitality of its victims. It is a universal complaint. No doubt much deficiency in personality may be traced to it: sluggishness, depression, a sense of failure and unfitness.

Realizing this, many people use cathartics, strong laxatives that bring quick though temporary relief; but the very remedy adopted for the cure of these troubles tends to make the complaint chronic. They resort to more frequent doses until finally a daily dose is required to get the desired result.

Whenever there is need for a laxative it is certain your diet and general mode of living are wrong. You are not using a sufficient amount of roughage, you are bolting your food instead of chewing it, you deny yourself time for elimination, dissipate energies so there is not enough for the normal muscular activity of the intestines, etc. Absolutely the best method



PHOTOGRAPH PACIFIC & ATLANTIC

Utilizing outdoor exercise for curative purposes, this gymnastic school provides equipment to enable children to overcome leg defects by simple methods.

of remedying this serious complaint is the drinking of large quantities of water combined with a change of diet, using foods which contain the naturally laxative, essential vital elements. These foods are enumerated in the volume on Diet. Fruits are valuable for this purpose, grapes being especially recommended, if the skin and seeds are not discarded. Exercises of various kinds, especially long walks, are always valuable.

Where you cannot get a diet or the exercise essential to effect a cure, the use of the enema as described in this volume is recommended.

Disadvantages of Cathartics

Whatever method you adopt, avoid strong cathartics. They are death-dealing. They bring about a condition wherein you are an easy victim to chronic diseases of all kinds. They disorganize the sensitive processes of digestion and as-

similation, and where these measures are frequently used one goes from bad to worse. The best remedy is to build your body through proper exercise and a vitality-building diet.

The persistent close association of the unclothed body with sex, in some people's minds, is most censurable. This attitude alone has caused much of the excesses that lead to vital destruction and often to degeneracy. The body is the sanctuary of the soul. In it we must live all through life. We should respect it and even reverence it. The air and the sun should help, by direct contact, to make it strong and beautiful and vital in every part. But when we acquire the idea that it is vile and shameful and must be clothed and hidden because of its evil character, this helps materially to devitalize it and destroy it prematurely.

Clothing and Morals

Clothing has nothing whatever to do with morals. The Turks, who are so modest that for centuries they refused to exhibit the faces of their women, are no great examples of morality. On the other hand, with some of the semi-savage tribes clothing is a matter of convenience entirely, yet their moral standard is high; in some instances adultery is punished by the death of both parties.

In most habitable regions clothing is necessary for warmth. It is not necessary for the protection of morality. The less clothing we wear, beyond what is needed for protection from cold, the better will be our health. We need the vitality which comes from direct contact with air, sunlight and water. The sun is either directly or indirectly the source of all life. The human body needs sunlight just as much as does plant life. A plant placed in a room away from the sun will die. It hasn't the vitality to resist the influence of a sunless existence.

Civilized races have covered the body with clothing for so long a period that the skin in some instances assumes death-like pallor. The healthy tan that comes from exposure to the sunrays is, however, enjoyed by an increasing number of people. The amount of clothing considered necessary to-day represents a truly marvelous improvement as compared with the prudery-smudged years of not long ago. But we are still encumbering our bodies with too much clothing.

While one cannot run straight in the face of convention with impunity, every person should favor those styles which



PHOTOGRAPH KEYSTONE VIEW

PLATE 65. Sun-bathing is a factor in treatment of these girls, attending a preventorium for incipient tuberculosis cases, in Arbonne, France.

make for exposure of the body to sun and air, the use of porous materials, and fashions that provide perfect freedom of bodily movement. Styles vary, but some are always more sensible than others. Everything, from shorts for tennis to bare legs for girls, that releases the body from superfluous clothing should be encouraged. Wherever it is possible to do so without offending the sensibilities of others, one should expose the whole body to sun and air. The particular parts of the body that we are careful to hide need sun and air more than any other parts, so every available opportunity should be accepted to give the entire body the benefit of sun bathing. It is a tonic of untold value.

Sun and air and water are invaluable, winter and summer, and no early shame associated with the body should prevent us from making the most of them, either in the course of relaxation, exercise, or specific curative purposes.

Rational Treatment of Disease

Disease is essentially lack of health. Those who specifically treat diseases are repair men like carpenters and plumbers whom some realty holding corporation might employ to keep its houses in repair but who never really design or build any new construction. The prevailing theory of the past has been that human bodies would build themselves and that help or attention was needed only for these repair jobs.

That view is wrong. The forces of Nature and Life are of course of far greater power than any mere intelligence that can be brought to bear on the matter of either health or illness. Moreover, these superhuman forces of Nature are as important in disease as they are in health.

In either case knowledge and intelligence can cooperate with and aid the forces of Nature. This can be done as well in the building of positive health as in the repair jobs. Certainly it is the part of wisdom to consider the positive building of health as of as great importance as, or greater than the repair jobs. So if the early stages of building be well done, much less repair will be needed.

B. M.

NATURE THE GREATEST PHYSICIAN

Section 1

IN THE earlier volumes of this work an attempt has been made to impress upon the reader the naturalness of health and the unnaturalness of disease. All diseases are really one. The apparent differences between diseases are mainly differences in altered functioning or differences due to specific accidents. If one is to master the art of health preservation and science of disease correction, one must understand the great general laws of health and disease, and interpret all symptoms by them.

Disease: What It Is and Is Not

We should not look upon disease as a hydra-headed monster that leaps upon one without warning, like a thief in the night; nor as a specific entity that invades the bodies of weak and strong alike; nor as a product of invisible microbes against which one is helpless unless one possesses some special immunity bestowed in some mysterious manner, or some exclusive immunizing agent discovered and elaborated by complicated laboratory procedures. Instead, when not due to accident or injury, disease is self-generated by most of the individuals harboring it. The conditions we usually term diseases are but the outcroppings or manifestations of the ill-health present in the tissues and cells of the body, and often the result of protective reactions on the part of the organism.

When one holds this view regarding sickness and changes in health, it is far easier to maintain health, for the causes of ill-health can thus be avoided with more certainty. It is also much simpler to restore normal functioning when this has been disturbed, thus bringing back health and its evidences. No matter what part of one's physical or mental being is involved, when one understands the reasons for doing or for *not doing certain things, it is much more probable that* beneficial habits will be established and harmful ones avoided—that the comparatively straight and narrow health-path will be followed. When the correct view of disease is held, when

the part the individual himself plays in the development and correction of disease is understood, the sanity of natural treatment becomes obvious.

There is a vast difference in natural resistance to disease, as manifested by different individuals. In some instances only minor errors of living are required, apparently, to cause various manifestations of disease. The same causes will produce numerous and often serious symptoms in one case, while in another there may result no symptoms or signs of disease whatever. The freedom from disturbances in the latter case will, however, be possible for a short time only. Those who, by commission or omission, fail to observe the rules of health will eventually develop the symptoms of disease, though the time may sometimes be quite far off.

There is also a vast difference in the response of different individuals to health-restoring measures. This was forcibly exemplified during the writer's extensive experience in conducting sanitariums, outlining and prescribing treatment for thousands of cases, and observing the results. It was found that this difference is so pronounced, even when the symptoms or diagnosed "diseases" were as nearly identical as it was possible for them to be in different individuals, that the rate of response in any individual case could not be accurately foretold. We may be reasonably certain that a given case will respond and good health be restored in time; *but how long a time* will be required to accomplish this end is never certain.

Treating the Individual, Not the Disease

For these reasons the various drugless measures for treating disease should be understood by everyone. Not only should the existence of these measures be known, but the particular effects they have upon the various functions of the organism and their adaptability to different manifestations of disease should be understood. It may not be necessary for one to memorize the details of all methods of treatment. In fact, unless one is engaged in the healing profession where one's memory is assisted by systematic employment of the measures, it is practically impossible to memorize these details. But the principles of the more important measures should be mastered so that upon occasion they may be applied with reasonable assurance of success. Any beneficial measure if applied haphazardly, or contrary to the principles governing

its action, may produce negative or even harmful results. This volume presents various measures that have proved of definite value in aiding the body to rid itself of disease that has developed through lack of care, or through definitely injurious practices. These measures help Nature to correct abnormal conditions of organ and cell-functioning, and, when this has been done, the symptoms of disease vanish. Some of them are valuable also in correcting certain mechanical defects, the results of accidents, strain, postural or occupational sprains, stress, and so on.

Diet and Health

Of equal importance with their use for the *restoration* of health is the employment of these measures in health *preservation.* If some of them were habitually and systematically used for this purpose they would rarely be required for health-restoration.



PHOTOGRAPH KEYSTONE VIEW CO.

Physical culture methods for fighting tuberculosis as followed in a preventorium for consumptive girls in France.

Diet as a means of maintaining or recovering health has been discussed extensively in Volume II. This measure, the writer firmly believes is the most important of all measures essential in building, maintaining, and restoring health. Yet it is one of the most neglected of measures, or has been until very recent years. A mechanical structure depends for its stability and the perfection of its functioning largely upon the material that goes

into it. The body is composed of and kept alive by elements taken into it in the form of food—in addition to those derived from water and air and less often recognized as nutritional necessities. Its health and the normal functioning of its organs and countless cells depend upon the presence of certain elements in propor proportions, without noticeable lack or excess of any. Without a proper diet, health cannot be maintained, regardless of how many other health measures are employed or how correctly they are applied, just as perfect health may be impossible, even with the most perfectly adjusted diet, without the regular use of some of the other health measures.

Exercise and its relation to health has also been discussed in detail in Volume III. From the standpoint of health-maintenance the exercises to be described in the present volume are in most cases unnecessary. Many of them would doubtless be useful for the preservation of health if taken instead of general constitutional, developmental, or recreational exercises, just as the latter may be employed as a supplement to specifically remedial movements. Yet there is a distinct difference between developmental or health exercises on the one hand and corrective or remedial exercises on the other.

Exercise in Relation to Health

Volume III presents the theory of exercise, with such exercises as are suitable for the maintenance of general health, for development, and for enjoyment. That volume gives movements that may be used by those suffering from abnormal physical conditions and in treating functional disorders; also movements requiring an assistant.

In many disorders active exercise is to be avoided, at least until certain changes have been brought about in the function or structure of some organ or set of organs. Passive exercise, then, often becomes important as a means of aiding circulation, elimination, and cell functioning, and of preserving or restoring muscle and nerve tone and joint motion. There is often some abnormal condition of ligaments, muscles, and other soft structures in which relaxation is desirable; yet, because of local tension and contraction, such relaxation cannot be secured by the individual himself. In these instances stretching and other manipulations by an operator become extremely valuable and important, for, during the manipulations, the patient may be perfectly relaxed generally—a condition impossible during

active exercise; for one cannot actively exercise without producing contractions somewhere, and these contractions may take place in regions where the opposite condition is needed.

In many cases not even passive exercise is advisable for a time. The patient needs rest and relaxation. In such cases *massage* will be of considerable use at a certain stage, if not from the beginning of the illness or abnormal condition. Massage is discussed in Volume VII, and the various phases of this excellent treatment illustrated so that one may give intelligent massage treatment with such knowledge of the structure of the body as may be obtained from study of the subject as presented in Volume I.

Passive Exercise

Complete mastery of any subject is certain to make one more proficient in that subject and more certain in the application of one's knowledge, it is true, and this applies as well to massage as to other subjects. But by even limited application of massage many a mother has soothed her baby or child, many an untrained nurse has given comfort, enjoyment, and definite health benefit to someone under her or his care, while possessing little or no knowledge of scientific massage or of anatomy and physiology.

Passive movements and massage are useful chiefly for those who are unable to secure general active exercise. But, while the former may not serve any particularly beneficial purpose



PHOTOGRAPH PACIFIC AND ATLANTIC

Open air treatment for children of London, England, showing a useful form of cot for sun-baths and outdoor service.

when given to one in good health with no structural abnormality, the latter is an excellent measure for occasional or regular use by the most healthy.

Massage may not only be applied by the manipulation of the hands and fingers and vibrating machines but by scrubbing the entire body surface with an ordinary floor scrubbing-brush—preferably wet. The average body possesses from 2500 to 3000 square inches of skin. This constitutes the most important gland in the entire body.

Hydrotherapy is the use of water for the treatment of abnormal conditions. Water is one of the most important of all natural agents for the preservation, restoration, and improvement of health. But the use of water does not end with such treatment. Habitual wrong use of water in health, or habitual neglect of the use of water, may have much to do with the lowering of all functions and the development of disease. For instance, frequent or prolonged hot-water bathing saps the energies, lowers the tone of the tissues, makes one anemic and susceptible to the toxemia that already exists in the body and to that which is further produced by the enervations resulting from the lowered tone. The use of cold water, when the vitality is below normal, may have a similar effect, and excessive use of cold water may have the same effect in the strong individual, by causing such prolonged depression, or such exaggerated reactions so frequently, as to exhaust the nervous energies. Failure to use water at all, or its inadequate use, results in lowered skin tone and defective skin elimination, with such added burdens thrown upon the kidneys as will lead to the disturbance of their function, and possibly, in time, to actual disease of these organs. The body suffers in other respects, also, from such neglect, and is rendered more susceptible to other disease-producing influences.

Water, Right and Wrong Uses of

A great many people believe that the only use of water employed externally is for cleanliness—just as many believe that the chief use of water internally is to dilute some other beverage. But another external use second to none in importance is its application for definitely beneficial effects upon the skin itself and through it upon other structures of the body, in disease as well as in health.

There are many modes of applying water. Some of these,

because of their nature and effects, should be reserved for use in certain abnormal conditions. Others may be beneficial in health, yet are of greater value in ill-health and will rarely be used in health because there are more suitable applications. There are still others that may be called hygienic, rather than corrective, curative, or remedial applications, these usually being reserved for use by those who are in good or fair health. The section on hydrotherapy aims to present in an understandable and usable manner the various kinds of baths and water applications that may be employed for promoting health, as well as for aiding in the eradication of disease.

Sunlight and Life

All power or energy, as we know it, originates in *sunlight*. The remarkable energy projected by the sun is transmitted to us by rays or waves. This power is classified as actinic and other forms of energy. Of all the rays coming from this great source, the ultra-violet rays have the greatest influence upon life and health. If these rays could be excluded from our atmosphere all life, both vegetable and animal, would soon cease.

Vitamins, which we know to be such important elements of nutrition, are provided by natural foods. When supplied in adequate amounts they protect us to a considerable extent from disease. When the supply is insufficient, complete health is impossible, and when certain vitamins are deficient, certain definite illnesses result. But if every human being were in direct contact with the sun's rays, we should not be as dependent as we now are upon vitamins in our foods, for we should derive them, to some extent, from the great source that supplies them to vegetation—the sunlight itself. The fact that we are not in direct contact with sunlight is responsible for much of our ill-health today—not alone because of possible deprivation of vitamins, but because of the many other values of sunlight that we are denied when it is shut out from our bodies.

One of the penalties of civilization has been the smothering of the body in clothing. For centuries, in civilized countries, clothing has been worn which prevented the sun's rays from reaching the greater portion of the body, or the parts where they would do the greatest good. We live sheltered within houses, from which, to save rugs, draperies, and other non-

essentials, a special effort is often made to exclude sunlight. The vitality is consequently reduced, the resistance is lowered, and disease "comes upon us." Unless the blood can absorb the ultra-violet energy from the sunlight, it is deprived of much of the oxygen that is so essential to life and health, for oxygen absorption depends in no small measure upon some specific effects of ultra-violet energy upon the blood cells and general tissue cells. We do secure enough of this ultra-violet energy and of oxygen to maintain life and sometimes a reasonable degree of health, but not enough to give us the degree of health and vitality that we should possess.

The value and need of sunlight are further explained in this volume, and also the means whereby the health may be increased through greater contact with sunlight. There is the natural sunlight that everyone knows—and the only form that most people know—which should be utilized to the greatest possible degree when atmospheric conditions will permit. But there are also means whereby artificial sunlight can be produced and made available for use by the body, in health and in disease. Section 4, *Sunlight a Foe to Disease,* is one of the most important in this volume.

Electricity Vital to Health

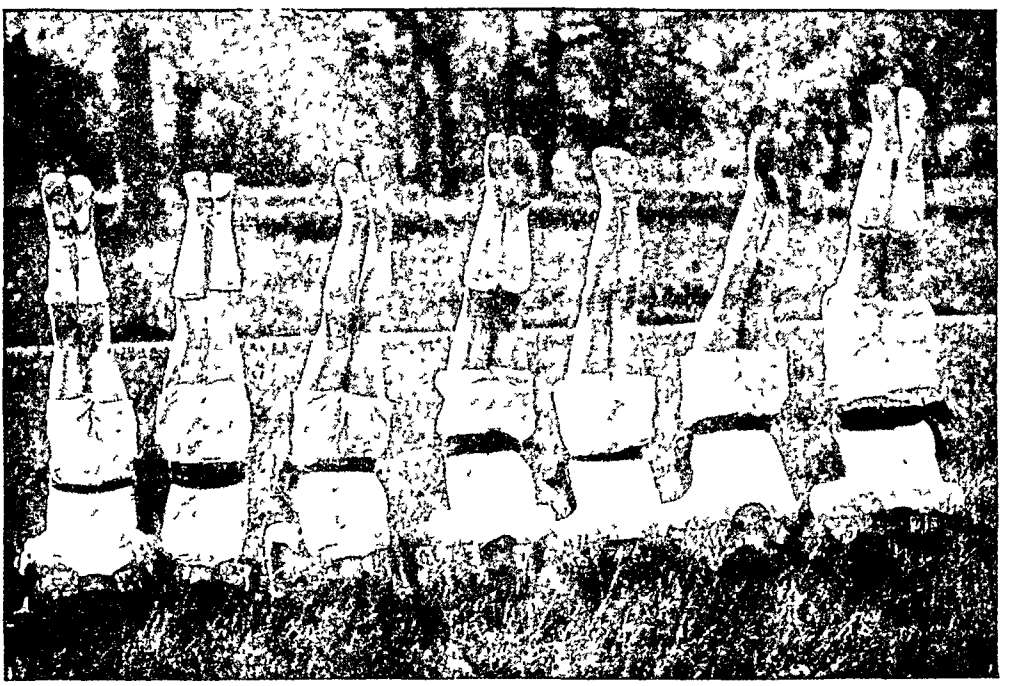
Electricity in the treatment of disease has fluctuated between approval and disapproval for many years, much as has hydrotherapy. But, as with hydrotherapy, it has at last reached final approval and is recognized as a definite beneficial measure in certain abnormal conditions. Electricity, as we know it, is not needed for the maintenance of health, though doubtless there are forms of electricity with which we are constantly in contact which serve to maintain our energies and retard the decline of health under unfavorable conditions.

It is thought that the person in poor health has less electricity in his body, forms less, and is capable of absorbing less from the universe, than one in good health. The person in vigorous health, on the contrary, has a great abundance of this force whether this condition be cause or effect. Heredity may govern the condition to some extent, but it is true that one's habits of living have an equally important or even a greater influence upon the amount and character of the body's electricity. Any means whereby this force may be increased in the body is of definite health value and worthy

of consideration. Various electrical modalities aid the body in correcting chronic disease, or the results of disease. Some of them have specific and peculiar effects upon certain abnormal conditions, chiefly perhaps upon indurations or hardenings and thickenings of, or loss of tone of tissues. Electricity is a natural force always present, but usually it cannot be self-applied, or employed in the average home, since it requires rather expensive equipment and more study to master than do most other natural measures. It is, however, a valuable addition to the armamentarium of the drugless practitioner, as well as to that of the medical doctor who recognizes its value—and there now are many such.

lectricity as Treatment

Many persons resent the slightest suggestion that they might receive relief from their physical troubles through any *mind treatment.* This is an injurious attitude to take, if for no other reason than that it may lead one to repel numerous good forces working for the betterment of the health. Even mechanical or other strictly physical measures may not produce their greatest good unless there is in the mind of the patient some faith or confidence in the treatment, and of optimism



PHOTOGRAPH KEYSTONE VIEW

Children suffering from most serious forms of disease have been developed into athletes by an American Y. M. C. A. physical director.

or hope for a favorable outcome; or, if the greatest good ultimately is accomplished, it is only after a longer delay than would be necessary with one showing a different mental attitude.

No one knows the extent of influence, for good or for ill, that may be exerted by the mind. Whether one is able to adjust one's own mental processes or must obtain assistance, there is no doubt that one's thoughts may be used as a definite aid in preserving health, preventing some manifestations of disease, eliminating some symptoms, and actually reducing the disease itself, nor is there any doubt that they may be used in a destructive manner, to accentuate any existing diseased condition or possibly to create disease.

Miscellaneous Health Measures

There are numerous so-called minor measures that may be employed to maintain good health, to prevent the development of ill-health, or to aid in correcting disease that has already developed. Some of these measures, however, are of much greater import than we have been inclined to believe in the past if, in fact, we have given them consideration at all.

These miscellaneous factors are discussed in detail elsewhere in this work. Although they have been ignored for the most part in the past, their study, as outlined in this encyclopedia is commended to the reader, because through them someone may find a clue to eventual escape from the bondage of disease or the abnormalities of ill-health. The more one knows of the major and the minor influences governing health and ill-health, the better will one be able to side-step ill-health as well as to be of service to others not so fortunate.

The numerous factors considered in this volume in detail may not all be necessary in any individual case. In fact it is safe to say that in no case will all of them either be employed or be necessary. But, knowing them all, one may be better able to determine what changes in one's manner of living will lead most quickly to perfect health.

WATER AND HEALTH

Section 2

HYDROTHERAPY is the scientific use of water for the purpose of aiding the body in its healing efforts. Hydropathy was the more popular term at one time, but it is now applied in scientific circles to the unscientific application of water to the body in disease.

Hydrotherapy is one of the very few remedies that have come down to us through the centuries since the day of Hippocrates, the Greek physician (400–500 B.C.) who today is often called the "Father of Medicine." Hippocrates possessed a far greater understanding of the action or effects of water upon the body than do thousands of physicians of the present time. He employed water at different temperatures in the treatment of a wide variety of disorders, and many of his prescriptions for the use of water have never been improved upon.

Hydrotherapy and Hydropathy

Almost a thousand years ago water was extensively used as a remedy by the physicians of Japan—while Europe was in the Dark Ages, which are often called "the thousand years without a bath." A Roman physician, in the first century A.D., (Celsus, by name) considered water as one of the three corners of a perfect healing system. The other two corners were exercise and friction (massage)—two other healing agents that have come down to us through many centuries. Other Roman physicians of the same era employed water enthusiastically and beneficially in various diseases.

But water was used in the treatment of disease even before the time of Hippocrates. There is no other remedy so ancient. It was used in disease and injury by ancient Egyptians, Assyrians, Persians, Greeks, Hebrews, Hindus, and Chinese.

One would think, from the noble ancestry of hydrotherapy, that every physician, every layman, would have at his finger tips the numerous effects and uses of water, as everyone has at his tongue's end the letters of the alphabet. Certainly

every member of every healing cult should be familiar with the numerous water applications and the abnormal conditions in which they are serviceable. The fact that so few of them do have such knowledge may be accounted for by the very simplicity of this great healing agent. Some of our modern physicians, instead of devoting their time to such simple measures, tend to deal in mysteries, which every layman cannot master for himself.

But another obstacle that has served to prevent or check the universal recognition and acceptance of hydrotherapy has been lack of exactness in its employment prior to the last few decades. There were formerly many untrained people administering a few water applications empirically, without being able to determine how or why they produced favorable, and sometimes miraculous results, or again, negative, serious, or fatal results. As always in such cases, one blunder or inaccuracy outweighs a thousand brilliant successes,—so far as doctors of the *other* schools of healing are concerned and, largely, also so far as the lay public is concerned.

Priessnitz: Pioneer in Hydrotherapy

One of the most successful untutored hydrotherapists and one who did a great deal toward diffusing knowledge of this art was Vincent Priessnitz, a German peasant "native healer" (1799–1851 A.D.). At seventeen years of age Priessnitz, after local physicians had pronounced his case hopeless, healed himself, of numerous injuries, including a double rib fracture, by the application of cold wet cloths. He had treated animals by water, and this gave him the idea of using the same treatment on himself. As a result of the incident many people came to him for treatment and he soon came to devote all his time to the care of these patients.

Because Priessnitz professed no knowledge which he did not possess, and because of his dignified bearing, seriousness, and evident earnestness in developing his system of treatment, he was recognized not only by the lay public but by the medical profession; and the head of his government, the Emperor of Austria, tendered him a diploma. France had a representative of the army study his methods and then introduced them into the French military service early in the nineteenth century—the first country to do so. Later other countries did the same.

The peasants of Germany had been using most of the water treatments employed by Priessnitz since before the middle of the eighteenth century. Priessnitz himself added little to these ideas, but he did combine them into a system. While that system would now be called crude and unscientific, yet, because of his keen observations of the effects of various applications upon each patient, Priessnitz was able to secure far better results than would most others who lacked as completely as he did any knowledge of such subjects as anatomy and physiology. And many *with* such knowledge have failed to secure such favorable results, because they have been content with a smattering of knowledge of hydrotherapy and have failed to adapt their measures as perfectly to each individual requirement as did this German peasant. Priessnitz has been called the "Father of Water Cure," but a much broader title has also been given to him, namely, "Father of Natural Healing Methods."

Hydrotherapy in Germany

To Wilhelm Winternitz, a Viennese physician and hydrotherapist (1835–1917), belongs the credit of placing hydrotherapy upon a really sound and scientific basis. Many others have done considerable work along the same lines, but in no case has it measured up to that of Winternitz. However, Dr.



PHOTOGRAPH KEYSTONE VIEW

Boys recovering from physical defects at an open air school in England.

Simon Baruch, of New York City, through his writings and persistent efforts, had the distinction of opening the minds of a goodly portion of the medical profession to the great value of hydrotherapy in both acute and chronic diseases. Considerable credit should go also to Dr. John H. Kellogg, of Battle Creek, Michigan, who, in his large sanitarium, has had an unusual opportunity for developing and systematizing water treatments and bringing his results before the medical profession.

Kellogg and Hydrotherapy

It has been fortunate that this great healing agent has been systematized and made into a science, for its physiological effects upon the body are so pronounced that improper applications may prove far more detrimental than beneficial. A great many men have devoted much time and thought to the physiological principles upon which the influence of water application is based. Unless these principles are understood, it is impossible to appreciate fully the true value of hydrotherapy, or to employ hydriatric measures with any degree of safety or uniformity of results. The various effects of water can now be better prognosticated than those of any other form of aid to the processes of the body.

It is impossible in this encyclopedia to enter as fully into such extensive treatment of the scientific basis of hydrotherapy as do textbooks on the subject. The aim is to present here the fundamental principles and then give specific directions for the most valuable methods of water treatment and those suitable, in the main, for home use.

Properties of Water

Water possesses four remarkable properties, all of which render it most valuable for healing purposes:

1. Great power in absorbing and communicating or giving up heat.

2. Great solvent properties, water being the one universal solvent.

3. Availability in three forms—liquid, solid, and gaseous (steam).

4. Adaptability to the form of its container.

No other therapeutic agent possesses so many admirable qualities as does water. It is the most flexible medium for producing the thermic and mechanical effects desired and can be applied either to a limited area or to the whole surface of

the body. No other substance is capable of absorbing so much heat as does water, for which reason it is taken as the standard of specific heat. It also gives up heat with great readiness. It can therefore be used either for abstracting heat from the body or communicating heat to it. Being a universal solvent, its use internally aids greatly in the elimination of uric acid, urea, salts, excessive sugar, and many other blood and food chemicals that are waste products. Such waste products readily accumulate in the body under certain abnormal conditions, causing more or less pronounced injury. Elsewhere we have shown the advantages of water when employed internally in the form of enemas.

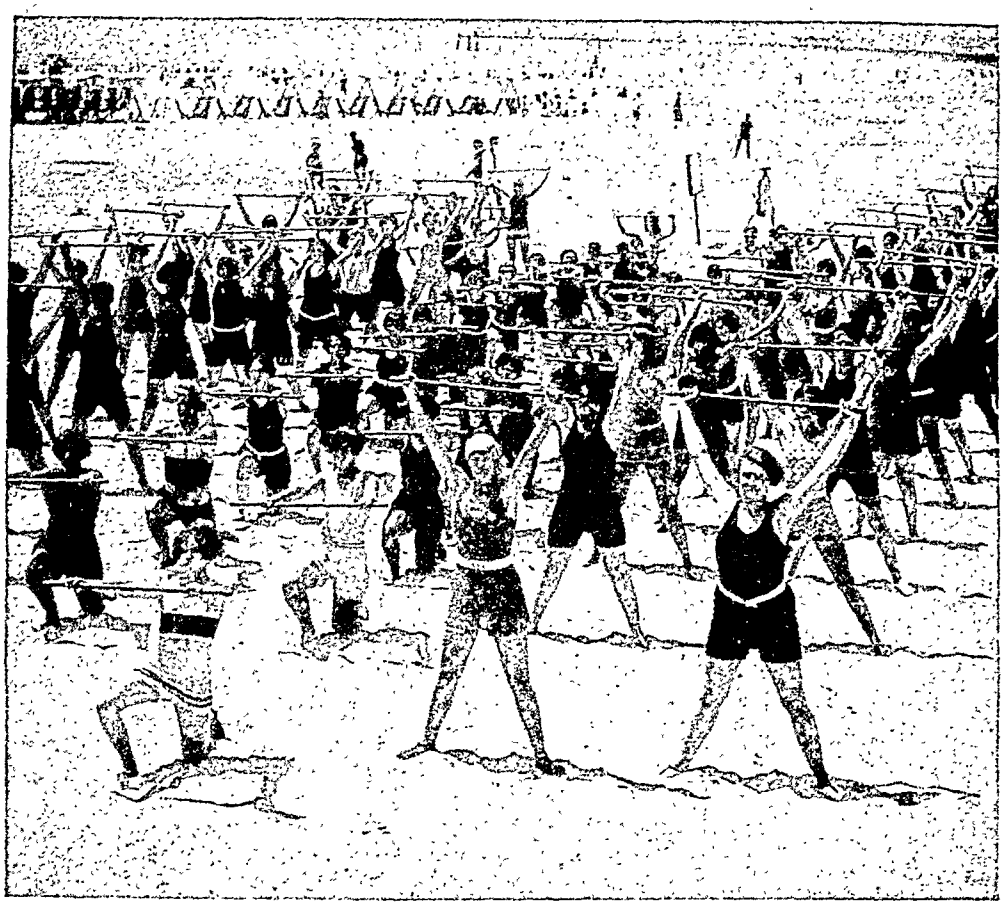
While, in both health and disease, water is usually applied to the body in its liquid form, there are conditions in which the application of its vaporous form, steam, has superior advantages. There are still other conditions in which its solid form of ice is both more convenient and more serviceable than any of the others.

Water a Two-edged Sword

It must never be forgotten, however, that water is a two-edged sword; that, while it is a most simple and natural remedy, it is one of the most powerful agents known to mankind. Therefore it must be used with wise discrimination in illness, and often in health when the natural vitality of the individual is much below the average. The resistant and reactive powers of a patient or subnormal individual must be observed, and water applications made accordingly.

For instance, let us assume that two individuals of entirely different physical nature have a serious catarrhal condition. One man is powerfully built, robust, and vigorous; the other is slender, frail, anemic, and of low vitality. Vigorous applications of cold water over a period of time might be very effective in aiding the body of the powerful man to eliminate the poisons. But the same treatment applied in the same manner might reduce the vitality, or bring about the death of the frail individual.

There is an historical case well illustrating this fact. A disciple of Asclepiades (a Greek physician who flourished 100 B.C.), Antonius Musa by name, became famous through curing Augustus, the first Roman emperor, of chronic catarrh by means of cold baths, and a statue was ordered erected in his



PHOTOGRAPH INTERNATIONAL NEWSREEL

Modern acceptance of outdoor exercise as a means of health building is evidenced by countless scenes of this sort on public beaches. In many instances, athletic directors are in charge of the exercises.

Water—Reflex Influences of

If by any kind of application, such as heat, cold, percussion, friction, or massage, a contraction of the blood vessels of the skin is brought about, a similar contraction will take place in the vessels in the interior of the body. This is the reflex effect. Usually the external effect is more pronounced than the internal, though not always. The reflex effect of thermic applications (heat and cold) conveyed from the surface areas to the central and sympathetic nervous systems, and through these to the organs and tissues in the interior, is a most important and valuable curative factor, influencing every one of the body's organs, tissues, and functions to a remarkable degree.

But there is another effect, of an entirely different character—the mechanical effect. When a contraction of the surface

vessels takes place, it forces the blood out of these vessels into those of the interior. As a result of this rush of blood, the internal vessels expand or dilate. The opposite phenomenon takes place also: a contraction of the internal vessels when there is a dilatation of the surface vessels.

Consequently there seem to be two opposing effects: that of the reflex action which contracts the internal vessels when the external vessels are similarly contracted, and the mechanical action which expands or dilates the internal vessels to accommodate the blood sent internally by the contraction of the external vessels; and the reverse of these actions. The reflex effect, however, is often momentary and slight, for the mechanical effect follows so rapidly afterward and is so much more pronounced that there can be no extensive or long-lasting reflex effect. This is especially true when the application covers a large area. The reflex effect is much more pronounced when small applications are made. One can understand, therefore, that the real effect of any application to the skin can be judged accurately only when both the reflex and the mechanical effects are taken into consideration. The real effect of the application is the sum of the two effects. It is dependent upon the comparative intensity of the two actions —reflex and mechanical.

Water—Mechanical Effects of

Not only should one learn something of these two actions, but it is extremely important also to learn something of the effects of different temperatures of water. A great many people take general baths of a certain temperature because they "like" them, without regard to what effect they may be having upon the body or the vitality. Even the general bath for cleanliness may be made a factor for health, though it is often instrumental in lowering the vitality of the body and making it susceptible to disease.

Effects of Cold in Hydrotherapy.—Cold water has the effect of improving the tone of muscles and blood-vessels, because reaction after its application increases tension. Warm water causes relaxation, and brings on dilation and reduction of tone.

Each produces a hyperemia or increase of blood in a part. But cold produces this effect through reaction, and is tonic in nature, while warmth does it through relaxation and is not a

tonic. To make a concrete application of these phenomena: a great many people of low energy and vitality, with low blood pressure and sluggish circulation, take warm or hot baths because for the time being they feel more comfortable. But such baths further increase the weakened condition by intensifying all the contributing factors of the symptom complex.

On the other hand, cold baths, or baths at a temperature below that of the body, will have the opposite effect, raising the vitality, improving the quality of the blood, and increasing the blood pressure. Progressively lowering the bath temperature (from day to day) is one of the most certain and safe methods of providing the body with a genuine tonic. But let us study briefly the effects of cold upon physiology.

The depressing effects of sustained cold are quite universally known. Foods are placed in a cool cellar or ice-chest for their preservation. The cold simply arrests the activity of the bacterial organisms in the food. The primary effect of cold upon the body, in whatever manner it is applied, is depressing. Cold water applied to the body, therefore, lessens the activity of the part to which it is applied, this depression continuing as long as the cold application continues, and also for some time after its withdrawal.

Cold Water Increases Tone

But, depending upon the vitality of the patient, the secondary effect is that of return to previous conditions or to greater activity. If one's vitality is low, even short cold applications may cause fairly prolonged depression and the return only to previous subnormal activity of the part to which the applications were made, or of the entire body in case of general applications. That is, in such cases, there may be no reactive increased functioning. But if the vitality is high, or if there be fever, there may be a quick return to normal and then a marked increase in activity beyond this. This return to normal, and especially the rebound to increased activity, is the explanation of the tonic effects of cold water upon those of good resistant vitality.

Thus by the use of cold water upon the surface of the body we have the apparent paradox of deriving a stimulating or tonic effect from that which primarily depresses the activity of the skin and subjacent tissues. This clearly shows that it is not the effect of the cold that one seeks to produce in most



PHOTOGRAPH INTERNATIONAL NEWSREEL

PLATE 66. The effects of cold have proved tonic and stimulating in the treatment of children weakened by confinement and malnutrition. Shown here is a group of patients blanketed as protection against winter breezes, taking an airing on the open deck of a hospital ship in New York City.

cases, but the *after*-effects induced or provoked by the cold sensations.

It is advisable to have an understanding of the different temperatures of baths. There is no classification that is universally accepted, for temperatures merge gradually one into another so that at best one must make an arbitrary classification. The following temperatures, however, may be considered as fully satisfactory:

Hot	104 degrees F.	(40.0 degrees C.)	or over
Warm	98 degrees F.	(36.6 degrees C.)	
Neutral ...	94 degrees F.	(34.4 degrees C.)	
Tepid	86 degrees F.	(30.0 degrees C.)	
Cool	68 degrees F.	(20.0 degrees C.)	
Cold	45 degrees F.	(7.2 degrees C.)	or below

There is an allowable range of from two to four degrees above and below each of the above figures for each bath, though a cold bath may range from freezing temperature (32 degrees F., 0 degrees C.) to 65 degrees F. (18.3 degrees C.). Neutral temperature in reality is about middle point of warm bath temperatures or slightly below. Sometimes "temperate baths" are mentioned. This means a temperature of about 78 degrees F. (25.5 degrees C.) for the water used in the bathing.

Bath Temperatures

Cold water or cold applications have many effects that it is well to understand. The primary effect of cold applications upon the skin is to contract the small blood-vessels in this structure and produce pallor and coldness. But as soon as the application is withdrawn, the contracted blood-vessels expand and the suffusion of the parts with an increased amount of blood brings redness to dispel the pallor or blueness. If the cold application continues for some time, there will be a reaction during the application as a protective measure, and the skin will become pink in color though still cold. Percussion, or slapping and friction, have much the same effect as cold water, causing first a contraction of the blood-vessels and later their expansion. It should be noted, however, that the effects of cold here given apply only in cases where there is reasonable normality of blood, circulation, nerves, and skin condition. That is, while the primary effect is always the same, the reaction as described may not take place if vitality

is low, the blood very anemic, the circulation very defective, the nerves reduced in responsiveness, and the skin decidedly below normal in tone. Whatever is said here of the effects of cold and hot and other applications refers to conditions not extremely abnormal.

A primary effect of cold upon the skin is to decrease or suspend the action of the *sweat glands*. This action is resumed as soon as reaction occurs, sometimes with marked increase when the applications are general. Most of our perspiration is insensible, the secretion being vaporized immediately and therefore not appearing on the surface as fluid. This insensible perspiration varies considerably in amount, depending upon the temperature of the surrounding air and the circulation and tone of the skin and its vessels. After cold applications there may be a marked increase, even though this is not perceptible. After local cold applications there may be local or general increase in insensible perspiration, but under some conditions there will be neither.

Effect of Cold on Perspiration

Another primary effect of cold upon the skin is to reduce heat elimination while the application continues. During the application the centers that control heat production are reflexly stimulated, which causes development of more heat in the body. But when the reaction sets in, the blood circulation through



PHOTOGRAPH UNDERWOOD & UNDERWOOD

Public health movements are stimulated by many groups of athletes such as here shown. The primary objects of such organizations include nudity and freedom of the body as well as athletics.

the skin is accelerated, which aids in further cooling the body because of the increased amount of blood being brought to the surface.

The sense of feeling or touch is reduced or otherwise affected in different ways by the application of cold water to the skin. For instance, there is a feeling of greater cold when the body is slowly immersed in cold water than when one suddenly plunges into it. A fine cold spray will feel colder than a heavy percussion douche at the same temperature or even somewhat lower, because the douche stuns the sensory nerves of the skin by its force and lessens their sensibility to temperature. In other words, the sensory effect is greater than the thermic effect. Ice applied to the skin for very short periods temporarily abolishes the sense of touch; but the same effect will be produced by prolonged applications of cold water considerably above the temperature of ice. Very cold applications, those approaching freezing, give rise to a sense of pain rather than of coldness.

Sensory Effect of Cold

The circulation of the blood and the frequency and force of the heart action are greatly influenced by cold applications. The sudden application of cold causes a shock which momentarily increases the heart action and pulse rate, consequently the circulation throughout the body. But this increase is of short duration; the beat soon returns to normal and then goes somewhat below normal. The degree of change in heart action and the duration of this effect depend largely upon the degree of cold applied, the duration of the application, and the extent of body surface covered. During prolonged cold applications the labor of the heart, following the brief acceleration, is greatly increased if the application is general or to a large part of the body surface. During a cold shower bath, however, which is usually of short duration, the primary acceleration is followed comparatively soon by a decrease in heart labor, because of the release of tension in the blood vessels throughout the entire skin.

Some localized cold applications will also decrease the rate of the heart-beat. Thus a very cold compress or an ice-bag applied over the heart for an hour or more diminishes the activity of this organ and consequently slows the general circulation of the blood throughout the body. On the other

hand, a cold application to the same region lasting for but a few moments will have a tonic effect, increasing the heart force and tension in the arteries.

The mucous membrane is a modified skin and, while it has not so many nerves of sensation as the skin, cold water applied to it will have effects similar to those produced by cold applications to the skin. The reflex effects produced by stimulation or depression (by cold) of nerves in the mucous membranes other than those of sensation may be very pronounced. The use of the cool enema and the copious drinking of cool or cold (not iced) water are among the most efficient means of combating a fever. The heart action may be slowed sufficiently by the drinking of cold water to reduce pulse-beats ten or twelve a minute. Naturally, the effects depend much upon the degree of coldness and the amount of water consumed, also upon the general health. The better the health the less pronounced will the action be.

Effect of Cold on Mucous Membranes

It is well to point out here that when one is in a state of physical fatigue, cold water should be used internally and externally with decided caution. It is necessary that there be sufficient nerve force remaining to bring prompt reaction after drinking cold water; otherwise a congestion will be created internally which may cause serious trouble. One may drink cold water safely while the body is well covered with perspiration, provided there is no fatigue—and, of course, provided ice-water is not used and the quantity is not immoderate, and further providing the heart is not racing from exertion.

The effect of cold external applications upon the organs of respiration is somewhat less pronounced than upon circulation, though this applies more to the duration than to the degree of the effect. Quick cold applications produce short, gasping breaths, these varying in degree of abnormality according to the temperature of the water and the abruptness and force of the application. When the body is immersed in cold water, there is an instantaneous quickening of the breath, after which the respiratory movements are decidedly slowed, but made deeper and fuller. A cold douche or spray to the front or back of the chest will greatly increase the rate of breathing. In cases of asthma, however, such treatment



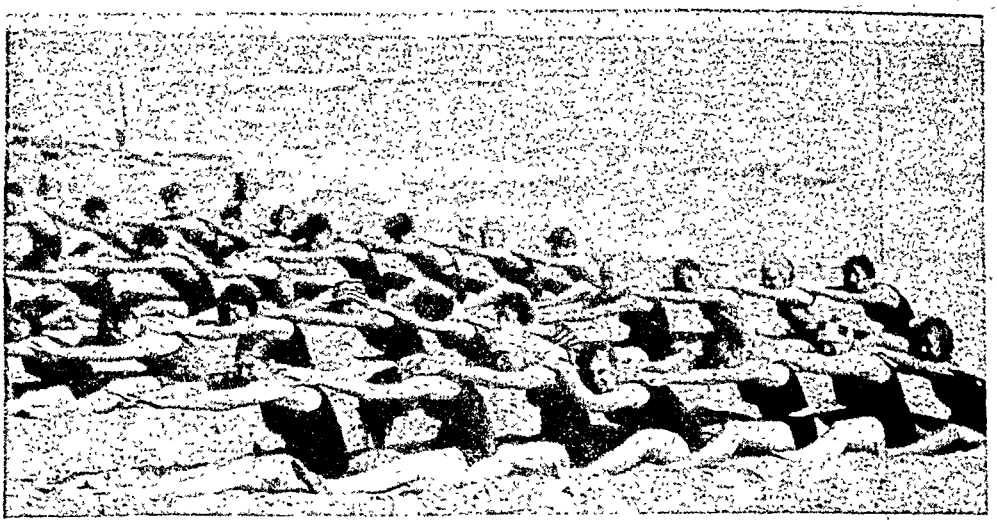
PHOTOGRAPH GEORGE P. PAUL

The sun-bath, now commonly practiced the world over, was almost unknown among white-skinned races a generation ago when costumes for the bathing beach shrouded the body completely.

is very likely to produce paroxysms of labored breathing and wheezing, with perhaps also a sense of suffocation. This latter distressing symptom usually disappears when the reaction sets in, and the breathing then becomes easier and more nearly normal.

The effect of cold upon the muscles is familiar to everyone, whether the cold be that of the atmosphere or of water. One's fingers become stiff and clumsy when allowed to remain in very cold air or cold water for any appreciable length of time. But when the cold water is applied for a short time, and especially briskly or with force, as by means of a douche, the effect upon the muscles is similar to that upon the skin—an increase in capacity for activity. Shivering is merely the result of tonicity increased above normal, being an automatic means of increasing heat production. In cases of muscular fatigue following muscular labor or exercise, a cold bath of two or three seconds' duration is a wonderfully restorative measure if it is preceded by a short hot bath and immediately followed by vigorous rubbing, quick dressing, and exercise sufficient to insure reaction to full warmth, or by the rubbing with very warm dressing or covering with bed clothing. The restorative effect of the cold bath will be much more pronounced if the bath is given with force, as by means of a douche hose. As an alternative the modern shower bath, over the stationary tub, is generally satisfactory.

Cold and Fatigue



PHOTOGRAPH PACIFIC AND ATLANTIC CO

Outdoor bathers today number a larger proportion of men and women than at any time in the history of civilization.

The appearance of goose-flesh upon the application of cold water to the skin is well known to all. Goose-flesh is due to contraction of the minute muscles in the skin attached to the hair bulbs. While the cold applications reduce the response of the muscles under our control (the voluntary muscles), they stimulate the involuntary hair-erector muscles, which causes the hairs to "stand on end." Applications of cold to small areas, especially to the feet, may cause goose-flesh over the entire body. Cold water applied to the skin of the feet or lower abdomen will often excite the involuntary muscles of the bladder and bowels, thus stimulating evacuation of urine and feces.

Cold and the Nerves

Cold water produces practically all its effects, whether upon the body as a whole or upon some organ or part of the body, through its effect upon some nerve or nerves. But there are some effects of cold that may be considered as chiefly nervous—those upon the nervous system particularly.

One authority on hydrotherapy claims that the proper application of cold to the surface of the body probably has a wonderful effect in influencing the storage and discharge of nervous energy.

In our study of the nervous system, in Volume I, we found that nerve cells do not connect directly with each other continuously, but that one nerve cell is in contact with another

through minute extensions of their substance. Now these minute processes or extensions are very much alive. They expand and contract according to numerous conditions. They act, in fact, very much as does the little one-celled ameba, and as do the white blood corpuscles, extending arms or processes when warm, drawing them in when cold. This would seem to be a completely satisfying explanation of the effect of cold in greatly diminishing or entirely abolishing nerve function. The nerve branches simply contract so as to break the communication with other nerves, thereby temporarily reducing or destroying function. This effect lasts but a short time when the cold applications are of short duration. In fact, if very short, the depression will be unnoticed, but there will be an increased excitation or ability to respond as soon as the reaction is complete.

Prolonged application of cold, then, diminishes nervous and mental activity. This is one reason why a cold compress at the base of the brain will often reduce the mental overactivity associated with insomnia, thus inducing sleep. But if the application is of very short duration an immediate reaction may produce the very opposite effect. And since a very close relationship exists between the blood and lymph circulations of the brain and those of the abdomen, a moist iced bandage applied to the latter will generally withdraw the blood from the brain, at the same time abundantly filling the membranes of the brain with lymph, thus supplying the conditions considered essential for normal sleep.

Influence of Cold on Mental Activity

Cold applied to the entire surface of the body or a large part of it has a very decided effect in increasing the number of blood corpuscles or cells, both red and white, in the general circulation; applied locally it increases them in the area thus treated. This is due largely to the contraction of the blood vessels of the viscera (liver, spleen, kidneys, etc.) by means of which the corpuscles are driven from their hiding places and put into active service.

Another desirable effect of cold applications upon the blood is the increase in rate of exchange of gases. That is, oxygen is taken up and carbon dioxide is given off by the cells more rapidly as a result of cold baths. The alkalinity of the blood is also appreciably increased by such applications.

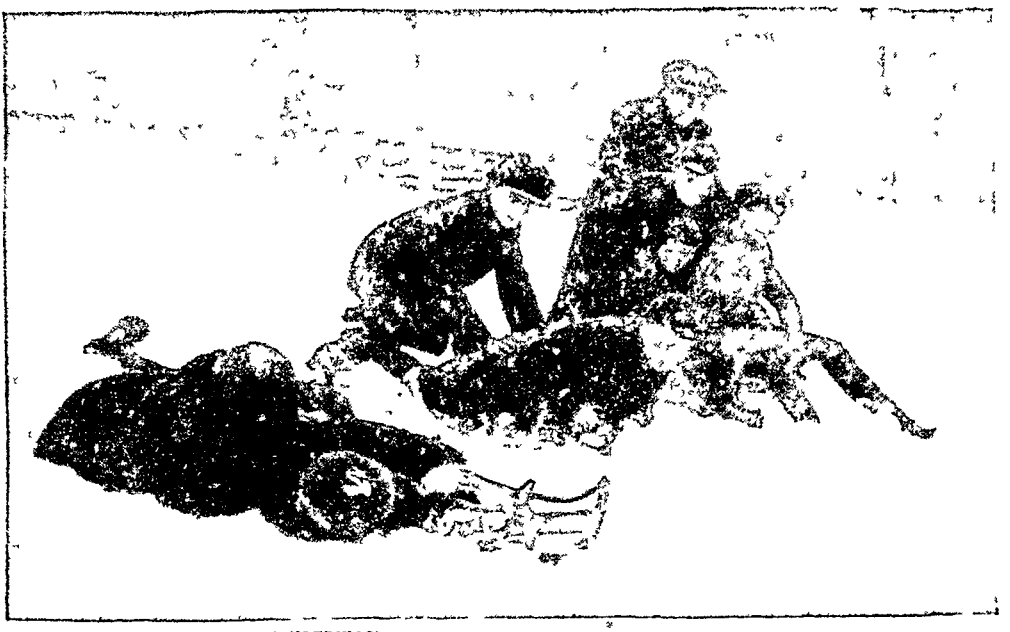
This is equivalent to reducing the "acidity" of the blood, though in reality the blood never becomes acid, as under such conditions life would be impossible.

Cold applications to the surface of the body greatly increase the absorptive powers of the gastric and intestinal mucous membranes, thus aiding in the process of nutrition. Rickets may be greatly improved when cold baths are given, a fact explained by the increase in absorption of phosphates from the alimentary canal, phosphates being necessary to the development of healthy bones.

Nutrition Aided by Cold Applications

Upon the secretions cold applications have a pronounced effect, as they do upon tissue changes. Applied over the abdomen, especially over the upper abdomen and the liver area, they cause a larger quantity of blood to reach the secreting cells and also stimulate those cells to secrete more actively. When gastric digestion is subnormal because of a deficiency of gastric juice, or of hydrochloric acid of the gastric juice, any pronouncedly cold applications over the stomach region will increase the amount of digestive secretions and thereby stimulate the digestion. This influence makes such applications harmful in cases of hyperacidity or gastric or duodenal

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PHOTOGRAPH UNDERWOOD & UNDERWOOD

Instinct seems to lead the growing boy and girl to the enjoyment of the healthful stimulus of cold. In hilly localities where snow is sufficient, two of the most appreciated and exhilarating winter sports are sledding and tobogganing.

ulcer, because in these cases the acidity already is too great. The various functions of the liver are augmented by the cold bath or cold applications, especially when accompanied by pressure, as by a douche or towel "spank."

Cold very definitely increases elimination. Its effect upon the renal and intestinal elimination has been mentioned. Cold applications stimulate kidney function, though if they are prolonged or, sometimes, when used in kidney disease, they may produce an undesirable congestion of the kidneys. When the applications are of short duration the effect will be beneficial. Such applications increase the kidney efficiency, as demonstrated by the increased toxicity of the urine following the use of cold baths in fevers. When reaction sets in after cold baths of comparatively short duration, the perspiration is increased, though it is greatly reduced when the baths are prolonged.

Cold and Elimination

The effect of cold applications upon body temperature has been fully discussed. The laws by which the temperature of the body may be increased or lowered are now well understood.

The reflex effects of thermic applications have been so thoroughly studied that it is now possible to influence many internal organs through reflex action brought about by making applications to the skin. By means of applications to certain parts of the body the internal organs may be affected according to whether the applications are hot or cold, short or long, or given with or without pressure (douche). For instance, the popular practice of holding a cold key or other piece of cold metal to the upper spine to check nosebleed is the recognition of a fact demonstrated by science that a prolonged application of cold to the upper spinal region relieves congestion of the nasal mucous membrane. These membranes may also be affected by applications to the face, hands, or feet.

Cold applications to the head, neck, face, hands, and feet may have a pronounced effect upon the brain, according to the differences in application mentioned above. Applications to the abdomen also influence the brain, as already noted. Applications to the chest and upper thoracic region affect the lungs. The stomach may be reached reflexly by applications to the skin over the "pit of the stomach" (the epigastric

region), or to the lower part of the dorsal or thoracic region of the spine. The liver may be affected by applications to the lower right side of the chest, while applications to the opposite side affect the spleen. To affect the kidneys reflexly, the applications are made to the upper abdomen, the lumbar spine, and the feet, while the feet and lower abdomen are the locations for affecting the bladder. Many cases of suppression or retention of urine which might have developed into something serious have been relieved by a cold foot bath of a few minutes' duration. The entire abdomen and the feet are the locations for applications affecting the bowels.

For the uterus the applications are to be made to the breasts, hands, abdomen, feet, lumbar spine, and inner surfaces of the thighs. Many cases of hysteria in women caused by uterine troubles may be relieved by applications of iced water to some of these points; yet in some hysterical women some of these locations, especially the breasts, are hysterogenetic points—that is, places that give rise to severe attacks of hysteria when manipulated or even touched.

Reflex Effects of Cold

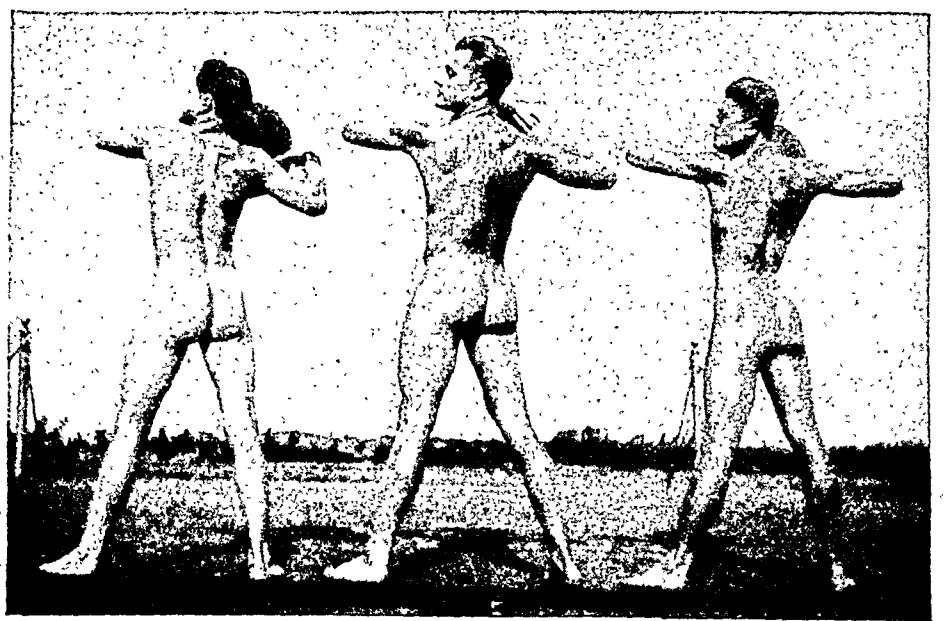
It will have been seen by comparing these various reflex points that there is overlapping. It is impossible to make any application affect any one particular organ without having some influence upon some other. This shows the very close interrelationship between all the organs of the body. Those who wish to employ hydrotherapy scientifically and with best results must study carefully and understand thoroughly the phenomena of reaction, for upon the proper understanding and application of the laws governing these phenomena the success of such treatment largely depends. There must be a knowledge of how to secure circulatory action and reaction and thermic action and reaction. Sometimes it is desired to prevent reaction, chiefly in some local condition, such as pain or hemorrhage. This is usually done by local applications of cold continued for long periods of time. In other instances it is desirable, even important, that the reaction be greatly encouraged, which is done by making the applications of shorter duration, or by giving them with friction or with force. Usually circulatory and thermic reaction occur simultaneously, though generally it is the circulatory reaction that is considered.

The application of cold has three effects: 1, first or primary effect, or *action;* 2, secondary effect, or *reaction;* 3, the sum of the two, which are remote effects and may be called *tonic effects.*

The action of cold is: to contract the skin vessels and cause dilatation of the internal vessels; to blanch and cool the skin, and to cause goose-flesh, cold sensations, and shivering; first to quicken and then to slow the heart action and pulse; to increase tension in the arteries; to quicken breathing; to check perspiration; and to cause slight elevation of internal temperature. The reaction of cold dilates the skin vessels and brings about contraction of the internal vessels, reddens and heats the skin, causes softening and elasticity of the skin and warm sensations, slows the pulse and increases arterial tension, slows and deepens the breathing; increases perspiration, and causes slight reduction of internal temperature.

Hydrotherapy and Reaction

Many times people feel so warm after a cold bath that they immediately repeat it. They are often painfully surprised to find that the reaction to warmth is much less pronounced after the second bath, and perhaps there is no reaction except through some vigorous measures. Sometimes the difference



DIETRICH GYMNASTIKINSTITUT, BERLIN, GERMANY

Examples of strength and body perfection — the results obtained by enthusiasts in health building.

may be barely noticeable, but the second reaction is always less than the first. If a third and fourth bath be taken, the reaction after each will be more feeble than the preceding one, regardless of a possible high state of vigor. It requires energy to rebound from a cold bath or application, and the various processes necessary to bring about a reaction may be paralyzed by repeated applications over a considerable area of the body. This applies, however, only to the reapplication immediately upon the onset of reaction from a previous application.

Reaction may be insured or made stronger by taking certain precautions either before the bath, during the bath, or after the bath. Warmth of body or room, or taking hot water or a hot enema or a hot bath, or exercising or rubbing the body to a glow before a cold bath, will make reaction more certain and more vigorous. The reaction may also be hastened and strengthened by the use of very cold water, by a very short application, by the addition of friction or force, or by alternating hot with cold water. After the bath practically any of the measures mentioned for use before the bath may be employed, friction and exercise being best.

Cold Applications: Reactions

Numerous conditions retard or prevent reaction and should be taken into account when cold baths are considered. Babies and very young children may not react well. Neither do aged people, especially those with even moderate hardening of the arteries. Great fatigue and exhaustion prevent reaction or permit of only feeble reaction. Anemic individuals, whether fat or thin, do not react quickly nor completely, nor do any fat people. Very nervous people, those with lifeless or cold skin, those who chill very easily or who greatly dislike cold baths or applications, and those of a rheumatic tendency, have poor reactions. Besides these conditions, there are numerous diseases and other abnormal conditions associated with defective reaction.

All cold applications reduce the body temperature somewhat, as well as the temperature of the skin. By *thermic reaction* is meant the restoration of heat lost, and the reestablishment of temperature balance. The cold bath depends for much of its great value upon thermic reaction. Every organ and cell is benefited by cold baths when they are followed



PHOTOGRAPH INTERNATIONAL NEWSREEL

PLATE 67. Certainty of healthful reaction is an essential necessity to such Spartan treatment as here photographed, at a sanitarium for tubercular children in the Eastern United States.

by proper thermic reaction—which, of course, will be associated with proper circulatory reaction. When reaction is incomplete, there is internal congestion which may be manifested by headache, weariness, pains of different kinds in various localities, dizziness, general weariness and in some cases by diarrhea.

Effects of Heat in Hydrotherapy.—Effects of application of heat to the body are as important as effects of application of cold, and the laws by which it operates should be thoroughly understood. Heat may be applied to the body in several ways, by means of hot water, fomentations or hot compresses, steam vapor, hot air, the direct rays of the sun, or radiation from some electric appliance that may or may not supply light also. As with cold, so the effects produced by the application of heat depend upon: 1, its mode of application; 2, its degree; 3, its duration; 4, the condition of the subject.

Internal and External Toleration of Heat

That the mucous membranes can endure water ten or fifteen degrees hotter than can the skin is evidenced by the fact that many people drink liquids hot enough to scald the skin. The water of an enema or rectal irrigation may be comfortably borne in the rectum while its contact with the skin upon passage will be extremely painful. In the Russian or vapor bath a temperature up to 120 degrees is generally employed, and some people can remain in such a bath for a short time at a temperature of 145 degrees, without discomfort.

Yet a water bath of even 115 degrees is hotter than most people can endure. In the case of the Turkish or hot-air bath the usual temperature is from 140 to 180 degrees, and in special cases it is raised to 220 or 250 degrees, without injury. In the salt works on the Colorado Desert, in Southern California, Indians and Mexicans used to work continuously during the hot summer months when special thermometers would register as high as 165 to 170 degrees, and yet sunstroke was unknown and few of the laborers experienced any serious discomfort.

The effects of heat upon the skin depend more or less upon the manner of its application and the degree; but the differences in effect are mainly in degree rather than kind.

Water at about 99 to 101 degrees Fahrenheit applied to the skin relaxes the surface blood-vessels, while applications at 104 and higher degrees cause contraction. Those who have been scalded tell us that intense heat causes slight shivering, exactly the same as cold. This and other effects similar to the effects of cold are however, of short duration. The general effect of water at moderate heat is to produce a dilatation of the capillary skin vessels and consequent reddening of the surface of the skin. If the temperature is gradually elevated, after one is in the bath, from comfortably hot even up to 130 degrees, the blanching of the skin and the development of goose-flesh and shivering usually resulting from very hot applications may be avoided. Knowledge of the constricting effect of very hot water or hot applications is of value in cases of hemorrhage. If applications at a temperature of from 120 to 160 degrees are used, and changed often enough to prevent cooling to a temperature useless in such cases, quite severe hemorrhages may be checked as readily as by cold, and sometimes more quickly.

Effects of Heat

The effect of moderately hot applications is not only to increase the dilatation of the arteries, but also of the small veins and lymph channels. The result is an increased amount of perspiration and of protective oil produced in the glands of the skin, together with a stimulation of the respiration through the skin. The perspiration may be considerably increased by moderate applications, or it may be increased from forty to sixty times the normal amount by general hot baths, electric-light cabinet-baths, or sun-baths. Because of the pronounced increase in loss of fluid from the body by means of perspiration during hot baths, it is highly important that one consume considerable water during the bath, or before, during, and after it. Otherwise the loss of large quantities of fluid may produce heart depression.

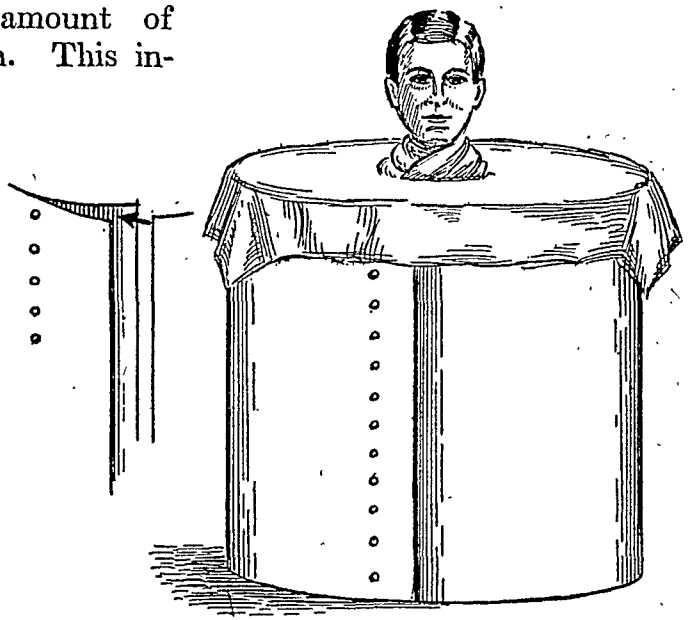
It is important to remember that prolonged and repeated stimulation of perspiration by artificial means when not followed by applications of cold weakens the skin and lessens its reactive power, putting it in condition to respond only poorly to cold applications, the cold restoring the tone and reactive power of the skin.

While the application of heat to the skin seems to increase

the heat of the body, in reality short applications increase the *loss* of bodily heat. This is accomplished: 1, by dilating the vessels of the skin and thus increasing the amount of blood exposed to the cooling influences outside the body; 2, by increasing the speed of circulation of blood in the skin; 3, by increasing the amount of perspiration, through increased activity of the sweat glands; 4, by increasing the conductive power of the skin, by which more heat is radiated from the surface.

Reaction Value of Heat

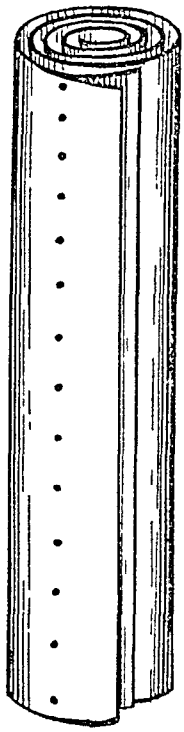
One very great value of the application of heat to the surface of the body is that it increases the amount of heat *in* the skin. This increases the activity of the nerves and blood vessels in this part and prepares it to react more promptly and vigorously to cold applications. When the heat is applied generally (or to certain



An inexpensive and simple cabinet bath for either hot-air or vapor baths may consist of a single sheet of any available sheet metal, bent in the form of a cylinder, with the two ends brought together, and the top provided by a piece of rubber or other material, leaving a space for the head to project. The cabinet should be about 4 feet in diameter. A tinsmith can make it, using a sheet of metal 12 feet long. In order that the two ends may fit snugly together, attach a strip of the metal on one end, as shown in the diagram at left, so that the edge of the other end may be inserted in the niche thus provided. If preferred, the edges of each end may be folded back in such a way that they may hook into each other when brought together. An alcohol or other quick heating lamp may be used.

The patient sits within the cabinet upon a chair. As will be noted in above illustration, this decreases the height of the body materially. Accordingly, the cabinet should be of proper height to accommodate its user when seated within it. This is to be kept in mind in the selection of sheet-metal suited in width to insure proper height in improvised cabinet. For the vapor bath place a small pan of water over the lamp. If heat is applied under a chair, the seat should be protected underneath by metal or asbestos.

areas that under its stimulation may greatly influence the entire body, such as the spine, the abdomen, or the feet), the entire body is prepared for quick reaction to cold applications or baths. Thus the hotter the preliminary applications, the colder the bath that may be taken with prompt and complete reaction—a fact that is contrary to the belief of most people. Because of this heightened reactive power, the preliminary heating of the skin is of very great importance in many conditions, such as fatigue, rheumatism, neuralgia, anemia, enfeeblement, and coldness of the skin from any cause.



Sheet metal for use as improvised bath cabinet. When unrolled and used in circular form as shown in illustration on page 2333, connecting edges may be fastened by bolts and nuts through holes (as in preceding illustration), or by other suitable methods.

Circulation and Heat

Heat materially affects the circulation of the blood. The first effect of a full hot bath is to increase the activity of the heart and produce congestion of the internal organs, especially the brain. Such effects make it unwise to administer such a bath to plethoric or "full-blooded" individuals, or those who have even slight degrees of arterial hardening, or who have had a "stroke" of apoplexy. Those who are so affected by hot baths as to develop fullness and throbbing in the head should avoid them unless they have a cold compress about the throat or a cold turban about the head. Hot compresses upon the spine or the abdomen, hot sitz-baths, and hot foot-baths also greatly stimulate the general circulation, as is indicated by the increase in perspiration often occurring during such applications and baths. Even hot hand baths will have this effect upon many people. Needless to say, such baths as the Russian and Turkish and the electric-cabinet bath all greatly stimulate the circulation.

The influence of heat upon the respiration is to produce easier and more frequent breathing, though the depth of respiratory movements is decreased. In other words, the amount of air breathed in and out is somewhat less than normal. Vapor baths (moist heat), especially, render the breathing easier and slightly increase the rate. But dry hot air, unless it is only moderately dry, will have an opposite

effect. After a hot bath there is a temporarily diminished rate and depth of respiration. A very hot tub bath produces a sense of tightness in the chest, very similar to that produced by a cold bath.

It has been noted that the primary effect of cold is to diminish muscular irritability and capacity for muscular work. This is the effect also of prolonged hot applications. The weakness following a long general bath is well known to most people. It is due largely to the weakening of the muscles, or, rather, the reduced capacity of the muscles for response to stimuli.

Very short hot applications, on the contrary, restore energy in people prostrated by prolonged or violent exercise, and have been used for many years for that purpose. More than a century ago a famous English army surgeon habitually employed the hot enema to revivify soldiers who had fallen by the way from exhaustion. When the vitality is seriously low the body does not have the power to react from a cold application. In such cases a *short* hot application produces the desired results. The effects are more pronounced and more lasting if it is followed immediately by a short, sharp, cold application, such as a cold-mitten rub or the application, with vigorous friction, of a cold wet sheet for two minutes or so, or a jet of cold water down the spine for a couple of seconds.

Hot Applications—Uses of

In nearly all cases where the hot bath has a weakening influence, this effect may be neutralized or quickly dissipated by a sharp, quick application of a cold shower, douche, rub, or pack, and all who use such baths and all who practice hydrotherapy should bear this in mind.

Cases in which there is a jumpy, twitching, fidgety, or very irritable nervous condition are relieved by neutral baths continued for half an hour or longer. Where there are spasms of the vagina, or muscles of the bowel outlet, the condition may be quieted by very hot applications, such as a shallow sitz or sitting bath, or vaginal or rectal irrigations. Very hot vaginal irrigations are very effective in reducing uterine congestion, catarrh, and hemorrhage. In cases of enlargement and chronic congestion of the prostate gland very hot rectal irrigations are of great benefit. Large hot enemas will usually relieve obstinate constipation by their stimulating effect upon the nerves and muscles of the intestines.

Hot water may be so used as to excite or depress the nervous system. Hot baths at first are exciting, but, if they are of short duration, such effects will be comparatively slight. If they continue for some time, the exciting effects will become pronounced, manifesting themselves, perhaps, in nervousness, headache, dizziness, and nausea. If they are of long duration, very hot baths (100 degrees, and above) will bring on nervous and muscular exhaustion. On the other hand the prolonged neutral bath, which is slightly below the temperature of the body (92 to 95 degrees), when continued for from thirty to ninety minutes produces such complete isolation of the nerve centers as to act as a most agreeable sedative. The brain is constantly receiving impressions from the nerves located in large numbers in every part of the cutaneous surface. In those who are nervously or otherwise very sensitive each of these impressions increases the excitement which it is desired or desirable to remove. The neutral bath not only has the effect of directly quieting the nervous and muscular systems, but, by completely isolating the whole surface of the body from these outside exciting influences, it materially helps in bringing about the desired soothing results.

Reflex Effects of Hot Applications

The reflex effects of local applications of hot water are as well understood as those of cold water, and they should be thoroughly known and mastered by the student of hydrotherapy. In the main, the localities are the same for hot as for cold. In addition to those given for cold, the nasal mucous membrane and the organs in the chest cavity may be reflexly affected by heat applied to the hands and feet, while the lower extremities may be reached reflexly through the lumbar spine.

We have learned that cold baths and applications increase the number of blood corpuscles, the amount of hemoglobin or coloring matter, and the alkalinity of the blood. When hot baths are followed by cold baths their unfavorable effects upon the blood are counteracted, unless the hot baths are out of all proportion to the cold and are taken at times without being followed by cold.

Hot applications are known to stimulate decidedly the action of the stomach, liver, and other organs concerned with digestion. Heat applied by any means to the stomach area an hour or two after eating will increase the amount of

hydrochloric acid secreted by the stomach. The intestines, pancreas, and spleen may be stimulated to more vigorous action by fomentations to the abdomen. General hot baths reduce the amount of hydrochloric acid—as does anything that increases the perspiration, which carries with it considerable salt (sodium chloride), thus reducing the amount from which hydrochloric acid may be derived.

Temperature Regulations by Hot Baths

Hippocrates first observed what a great many people have observed since, that the body is more susceptible to a cold atmosphere after short hot applications. Such applications lower the heat in the body by reducing heat production and increasing heat elimination. By short applications is meant those such as the average person uses in his or her daily or weekly hot bath—five to fifteen minutes' duration. Prolonged hot baths raise the temperature by increasing heat production and reducing heat elimination. In fact, there may be such accumulation of heat in the body from hot baths of long duration as to endanger life very quickly. It is said that the temperature of the body rises one degree for each increase in external temperature of twenty degrees above normal body temperature.

While the reaction following the use of cold water is usually to be preferred, there are times when reactions from hot applications or baths are of greater benefit. Ordinarily the reactions from heat are undesirable, because they depress and lower tone. While the action may be what is desirable, the reaction, being opposite, may be positively prejudicial to health, except under certain conditions.

Neutral Baths

Neutral baths—by which term is usually meant baths at temperatures from 92 to 95 degrees—have no pronounced action or reaction. However, a prolonged neutral bath does have a most beneficial effect upon the nervous system and upon nutrition, through prevention of numerous external stimuli reaching the body during immersion. It is through the protection against these outer stimuli, and not through depression, that such baths produce their soothing and calming effects.

One of the most stimulating of all applications is the alternate hot and cold bath, especially by means of the douche. This is a most efficient means of stimulating nutrition and of overcoming local congestions and anemias, without

causing any disturbances of the heat balance of the body.

From all the foregoing it will be seen that vital reactions and organic changes of great importance may be brought about by the practical application of the principles of hydrotherapy. The nerve centers, the heart and blood vessels, the voluntary and involuntary muscles, the digestive system, every organ, every tissue and every cell, also every function throughout the body, is affected profoundly by hydriatric applications.

These effects may be increased by mechanical stimulation of the surface of the body, as by friction and percussion. But such mechanical stimulation may be employed independently of hydriatric applications. Friction may be light, energetic, or very vigorous, and each method has its specific effects and its specific value in certain cases. Light friction increases blood pressure and rate and force of heart action, but reduces respiratory movements. It gives rise to a slight increase in heat production and a slight reduction of heat loss, thereby raising the body temperature slightly. Energetic friction causes dilation of all the fluid channels of the skin, hastens circulation, and reduces temperature by decreasing heat production and increasing heat loss through the large amount of blood brought to the surface. Very vigorous friction has effects similar to those of very cold applications, markedly lowering the temperature, slowing the heart and respiratory actions, increasing the output of urea in the urine, and often giving rise to the appearance of albumin in the urine.

Mechanical Stimulation during Baths

Friction improves the action of the oil and sweat glands of the skin, thus improving the texture and health of this structure, and restoring "life" in cold skin. Applied in the direction toward the heart, it hastens the flow of blood in the veins and improves the processes that take place in the cells; applied outwardly from the heart, toward the end of an extremity, it brings about slower circulation and reduces cell changes, serving as a sedative. Bear in mind the hydrotherapeutic value of friction as applied to nearly 3000 square inches of skin covering the average-sized human body, by means of an ordinary wet scrubbing brush. This hydrotherapeutic exercise applied to every square inch of this great skin-gland is a constructive means of vitality building.

Percussion (by means of water through a hose or douche

tube) also has its specific effects and value, though its effects are practically the same as those of friction. It has been found that, where an unbroken stream of cold water is projected upon the body with strong pressure, the immediate effect is to contract the vessels, thus forcing out the blood. As soon as the stream and pressure are removed, the vessels dilate again. Thus by the constant moving of the stream to different parts of the surface an alternate contraction and dilation of the blood-vessels is produced. According to the greater or lesser power with which this douche is applied, and according to its temperature, are its effects gauged. In the hands of an efficient practitioner both friction and the hot and cold douche are of the highest value.

There are some general principles that should be well understood by those who wish to employ hydrotherapy with success, either in their own cases or in cases of illness or disorders in others. The first and fundamental principle is that which has been laid down throughout this series of volumes, namely, that it is the patient and not the symptoms of his disease that must be treated. In the final analysis, practically all disease is due to some impurity of the blood. Disturbances of nutrition and local congestions and anemias may be very prominent in the causation of disease, but the cause even of these may be and usually is an abnormal condition of the blood itself. The various manifestations or symptoms of disease are, as a rule, merely the efforts of the body to get rid of the poisons generated in the system on account of the abnormal state of the blood. These symptoms may be to a greater or less extent modified or increased by the personal idiosyncrasies or susceptibilities of the patient. The aim should be to understand the patient and the underlying causes of his disease, since these causes must necessarily vary somewhat in different cases, in accordance with the constitution and habits of living. Then, while keeping such symptoms as may be present, or as may appear from time to time, under observation, efforts must be made to aid the body in its own natural way to eliminate the disease. The relation of his habits of living to the disease must be explained to the patient so that he may understand the necessity of altering these habits.

General Principles of Hydrotherapy

The state of the heart, lungs, liver kidneys, nervous

system and all other vital organs and structures must be known, and the reactive powers must be determined. These can be disclosed only by careful examination and observation. A patient who is feeble and who possesses limited vitality and reactive power must of necessity receive remedies somewhat different from those prescribed for persons of vigorous body and strong reactive power; or at least modified applications of the same forms of treatment are necessary.

Reaction Important

A most careful study of the reactive power of the patient should be made after each application, so that the progress of the treatment, whether favorable or unfavorable, may be ascertained. Often, when there is improper reaction to low temperatures, the desired effect may be produced by strong friction during the application, or increased pressure of the douche, without modifying the temperature.

After short cold applications a glowing red color of the skin indicates normal reaction. If good friction does not bring about this reaction within a minute after the application has been discontinued, then some form of hot bath should be employed before any further cold applications are used. The hot baths that may be employed are tub bath, steam or electric-cabinet bath, shower or douche, blanket pack, or even merely a hot foot-bath, either of these to be continued for from three to five minutes, to prepare the body for the cold application and a perfect reaction, and also to reduce the sensation of cold during the later application. Yet if very hot baths are given and it is desired to terminate the treatment with a fully cold application, it is sometimes better to precede the cold with a barely cool or warm bath—intermediate between the very hot and the very cold.

Time Required for Baths

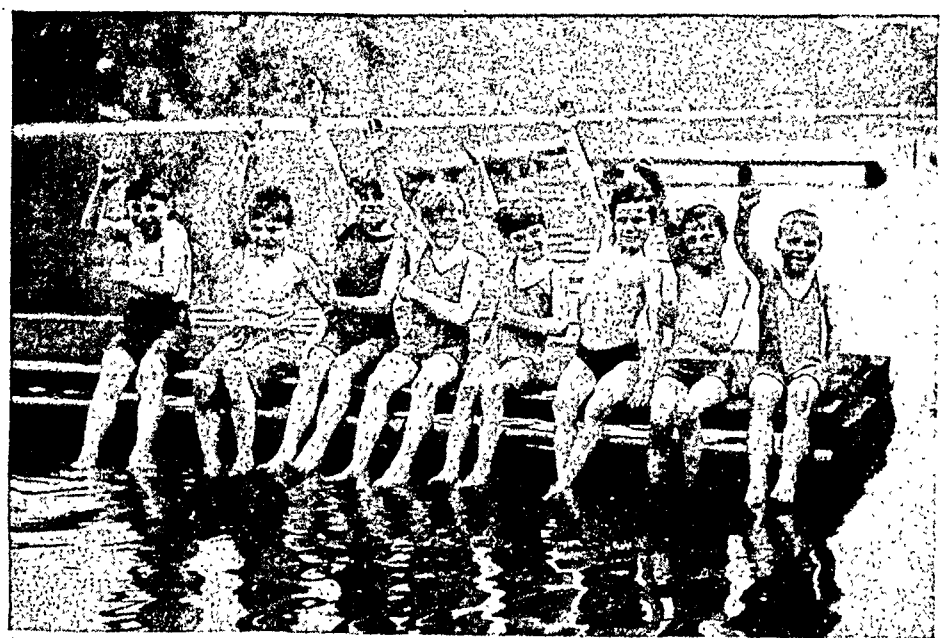
As a general principle, the lower, or higher, the temperature of the water, the shorter should be the application. From one to five seconds is long enough for very cold applications, ten to twenty seconds for decidedly cool ones. Tepid, warm, or hot showers or douches may continue for from one to fifteen minutes, but very hot baths by any means should not continue over one or two minutes. Fifteen or twenty minutes will not be too long for cool applications employed to reduce fever or inflammation. The neutral bath, as already explained, produces no reaction and does not exhaust the energies, hence,

for sedative effects, it may continue for from half an hour to one or two hours, and there will be no contraindication to using it much longer.

Since it is cold applications that produce best effects through reaction, one should aim to develop the reactive powers if they are deficient. This may be done by lowering the temperature of the water from day to day until decidedly cool, and finally, decidedly cold baths may be taken with complete and prompt reaction within normal time afterward. Frequently repeated short cold applications produce the best and most durable effects but, of course, this does not mean one application after another. It means, as a rule, applications repeated after several hours, or once a day.

Repeating the Application

Depending upon the patient's vitality and reaction, cold applications may be exciting in effect, by producing too vigorous reaction, or they may be sedative or exhausting instead of bracing. These latter effects may be avoided by shortening the cold bath or modifying its temperature, or by preceding it with some form of hot bath, especially with friction or percussion. Those who are anemic or abnormally



PHOTOGRAPH KEYSTONE VIEW

Nature itself beckons the normal human being to the pleasures of bathing even in childhood.

thin, or nervously exhausted, must have cold applications of short duration when used at all, and the duration may be progressively increased as the quality, quantity, and circulation of the blood, and the nervous energy improve.

Moist Skin Lowers Reaction

While weak patients are bathing or being bathed, precautions should be observed to avoid long exposures to the air at the conclusion of the bath, while the body is moist, since in this moist condition heat is radiated rapidly and the heat production is not equivalent to the loss. This same fact makes it imperative that the patient's body be thoroughly dried after each bath when the recuperative powers are below normal. The stronger the friction during drying (within reasonable limits), the more certain and the more rapid will be the reaction.

Preparation for the Bath

Whenever possible, patients should take some exercise before taking a bath, especially before a cold bath, for the reason that the tonic effect of the bath is increased thereby. This is particularly true when a slight perspiration is produced by the exercise. Even a profuse perspiration is desirable in those who possess rugged bodies, great vitality, normal nerves, and no organic defects. But where there is weakness and enfeeblement, from whatever cause, one must guard against profuse perspiration, because, to secure such, there must be such expenditure of energy that, instead of there being a normal reaction after the bath, there are likely to be chilling and other undesirable effects. In any case in which exercise is taken prior to a cold bath, the bath must immediately follow the exercise, to avoid lowering the reaction capacity by cooling of the exposed body through evaporation from the moist surface, and, when the vitality is low, the radiation of heat from a moist body is particularly to be avoided.

Outdoor exercise, such as vigorous walking, bicycle riding, or any other activity that will exercise the muscles sufficiently to produce slight or more pronounced perspiration, is preferable to indoor exercise; but any form of indoor exercise may be taken when outdoor exercise is not available. Any form of exercise, whether indoor or outdoor, is preferable to warm or hot applications. Various gymnastics—club-swinging, dumb-bells, weight pulling, tension, resistance movements, etc.—are excellent forms of exercise for "warming up" in



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PLATE 68. A process of gradual exposure during the Summer and Fall has built up resistance in these young tubercular patients so that they are inured to exercise and outdoor life under rigorous conditions. In such procedure, caution is always necessary to avoid over-exposure and absence of healthful reaction.

preparation for a bath, at the same time being excellent for the body in other respects. Such exercise should not be too strenuous, for, if the action of the heart and lungs is greatly accelerated, it will be necessary to wait until they have quieted somewhat before taking a cold bath, or injury will result. And during the waiting the evaporation may cool the body enough to interfere with reaction.

When the taking of exercise is inadvisable or impossible, preparation for the cold bath may be made by massage. Of aid also is friction by various methods, especially the use of a wet scrubbing brush, vigorously employed until the skin is a glowing red, particularly up and down the spine and over the entire body's surface. Improvement also may be effected by applying heat by many methods, and by manipulations of the sort described elsewhere in this volume under mechanical treatments.

Exercise after the Bath

If reaction is not prompt, exercise after the bath is as important as exercise before it. For best results it should be taken both before and after the bath. While reaction may be established by means of artificial heat, and such means may be more agreeable than exercise to some people, the reaction thus effected will not have the same tonic effect as that produced by exercise. The broad general principle to be followed in this matter is that the most desirable reaction after a cold bath is the reaction established by the forces of the body itself. For further discussion of this subject the reader is referred to *Reaction or Recuperation* in its alphabetical position.

Having completed this general presentation of some of the fundamental principles of hydrotherapy, let us take up in alphabetical order, for the greater convenience of the reader, the various subdivisions of the subject of baths and bathing, including the Internal Bath, Air Bath, and Dry Friction Bath, these being allied hygienic and curative measures of great potency and value.

ABDOMINAL BANDAGE, DRY.—Though this measure is employed without the use of water, it is usually used in conjunction with a moist bandage. The bandage consists of strip of flannel from 10 to 15 inches wide and long enough to encircle the trunk two or three times. In cases of indigestion or digestive weakness it is very helpful, because of the warmth

Dry Abdominal Bandage

that it produces and retains about the abdomen. It is valuable for use during daytime when the heating compress, discussed under *Compresses,* has been worn at night. It may not be necessary in warm weather, but should be used by those in lowered health and vitality in winter after the heating compress has been removed, whether this latter has been used during the day or at night.

ABDOMINAL PACK.—See *Girdle or Abdominal Pack.*

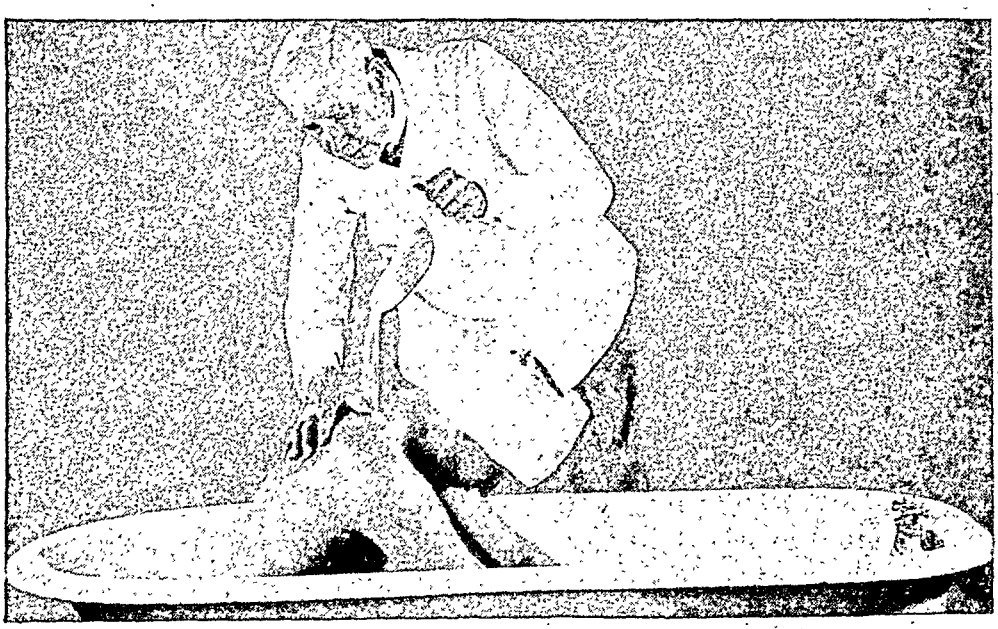
ABLUTION.—See *Sponge Bath* and *Towel Rub, Cold.*

AFFUSION OR POURING BATH.—This is a very simple bath that has been employed for centuries, the water being poured upon the body or some part of it from pails, basins or pitchers.

Affusion (Pouring Bath)

Effects somewhat like those of an ordinary douche may be produced by this pail pour, or *pail douche,* as the bath is sometimes called. The pressure is not so great as that produced by the douche; which fact, together with the fact that large parts of the body may be bathed at the same time with very little mechanical effect, makes the bath somewhat similar to the immersion bath in its effects. Greater pressure may be obtained by pouring from a greater height.

When other appliances for bathing are not available, this is an excellent bath to employ in numerous abnormal conditions. In the home it will often supplant the douche. Every



The spinal affusion is employed in various forms for various purposes; but the cold application is especially effective as an invigorator.

preparation should be made for it before the patient's body is exposed to the air, so that there will be no delay after it is started. Discomfort or perhaps injury may result from arresting any bath during its progress.

The best way to give the affusion bath is while the patient sits in the empty tub, which has the plug drawn to allow immediate escape of the water as poured. Sometimes, however, the patient may stand, or he may lie on a couch properly fitted with a rubber sheet, but have the foot of the couch elevated so that the water may run off into a tub or basin suitably placed. From three to ten pails of water at the desired temperature should be in readiness. A very cold wet turban is placed about the patient's head after fully wetting the head, face, and neck with water colder than that to be used in the affusion. In the case of cold or feeble patients the skin should be warmed before the bath.

Method of Giving Affusion

The water in the first pail is poured over the hands which are folded over the middle of the chest so as to protect the heart and upper abdominal organs and the next pailful is poured over the upper back. The other pails are poured alternately over the front and back in the above manner. The bath terminates with



The affusion or pouring bath is given while the patient sits in the empty tub. Both the hot and the cold affusions are given in this manner, the temperature being determined by the effects desired. Usually the patient should sit in the customary manner rather than kneel.

vigorous rubbing of the back, legs, and feet, by the attendant, then wrapping in a sheet and careful drying. The patient himself, if he is strong enough, does some rubbing of his arms and abdomen. A wet scrubbing brush also may be used.

Local affusions may be made to any part desired, though all factors concerned with the bath may need to be modified to suit the particular case. However, *this is true of all baths.*

Temperature of Affusion

The temperature of the water for the affusion may be as low as 50 to 60 degrees, or as high as 105 to 110 degrees, according to the effects desired. The cold affusion produces very pronounced reactions, and hence is very good in numerous cases of disease where there is high vitality. Hot affusions are very exciting, but are followed by reactions that are often undesirable, as they reduce tone. Affusions of neutral temperatures are sedative in effect. This is particularly true of the neutral affusion to the spine. When applied to local areas, alternate hot and cold affusions are powerfully effective in shifting circulation, thus reducing congestions and inflammations.

Uses of Affusion

Affusions have a wide variety of uses. They are especially valuable in cases of fever where there is congestion of the lungs or brain, or heart weakness, without organic abnormality. In scarlet fever and typhoid fever it has been claimed by some eminent hydrotherapists that the mortality may be reduced very near to nil by this bath properly employed. It is very beneficial also in the capillary bronchitis of children, being applied in this case to the chest and shoulders. The child may be seated in a tub partly filled with fairly hot water (100 degrees or slightly above), water for the pouring being used at 60 degrees or but slightly lower. Only a couple of pails of water should be used, then the body rubbed well while in a sheet and a blanket, the rubbing being with the hands sliding *over* the coverings, not with the coverings themselves. In very young subjects, or those who are feeble, the affusion should be at a temperature of about 85 degrees, possibly a few degrees lower (down to 80 degrees).

Cold affusion baths should not be employed in cases of heart disease, in tuberculosis, especially when there have been recent hemorrhages, in asthma, in acute kidney disease or peritonitis, or uterine fibroids that cause hemorrhage. These

are the main contraindications for the use of this bath.

Cold affusions will be found to be of much benefit in many conditions of the brain and spinal cord. Applied to the spine they are excellent in cases of neurasthenia, and when applied to both the head and the spine they are of value in acute meningitis. In the treatment of delirium tremens they may be used with benefit, and also in certain cases of insanity and cerebrospinal inflammations. They aid resuscitation in fainting spells and benefit typhoid and typhus fevers; in fact, they may control temperature in any disease.

AIR BATHS.—In a state of natural living the body is not covered with clothing; hence the skin is exposed to the air. This, together with the frequent or occasional friction of the surface while in contact with earth, sand, grass, and shrubbery, keeps the surface of the body in an excellent condition. In civilized countries and, necessarily, in very cold climates, the skin is covered and smothered with clothing. However, in Tierra del Fuego, the islands at the southern extremity of South America, hence close to the South Pole and very cold, the natives often run through the snow, clamber over the ice, and even hunt without any clothing. But the skin of the average civilized person never knows the feeling of air in contact with it for more than a few seconds at a time. Thus the average human skin is bleached and anemic as much from lack of contact with circulating fresh air as from lack of sunlight. But we can accomplish a partial return to the natural state by the practice of air-bathing, and in that way keep the pores of the skin active and all its structures more healthy. The value of friction baths by flesh or scrubbing brushes may be here mentioned again.

Air Baths

As stated elsewhere in this section, there are constant vaporous exudations from the pores of the skin onto the surface, from whence they should be taken by the air through the process of evaporation. When these vapors are generated in great quantities, they become condensed in the form of liquid (sensible) perspiration, or sweat. But this, too, will rapidly evaporate as it comes to the surface if the air is permitted to play freely upon the skin. In the average case it is absorbed by clothing, from which evaporation takes place more slowly. In the summer there is much more of this

Ski Fur

perspiration, and the process of its evaporation serves to keep the body cool and reasonably comfortable when otherwise it would become overheated. Wonderfully, indeed, has Nature provided for our every need!

Air Baths and Glands of Skin

The area of the lungs to which the air is exposed upon breathing is said to be about 2000 square feet. It has been estimated that the average person's skin contains eight miles of sweat glands and oil eliminating pores as important as they are minute. Simplified into round figures, these may be estimated as comprising 11,000 square feet of gland surface. The skin surface as we see it is only about 2500 to 3000 square inches in the individual of average size; but, when we consider the dippings of the countless pores, there are about 11,000 square feet to the skin surface. Thus there are about 13,000 square feet of surface in the lungs and on the skin for air to reach. We cannot keep air away from the smaller surface—the lungs with their 2000 square feet—without causing death. Neither can we completely keep the 3000 square inches of the skin surface from air without fatal results. But this very great surface of 11,000 square feet was intended for greater activity and better health-preserving influence than we allow it to exert.

The Air Bath: What It Is

By an air-bath is meant the exposure of the entire nude body to the air—which is a fluid medium entirely surrounding the body and in contact with every part of it, just as is water when the body is immersed in it. This is the natural condition of the body so the idea of an air *bath* never would have occurred to anyone if it were not that the skin has been deprived very largely of air—has been stifled, suffocated, smothered—by the irrational use of coverings. Air baths give the skin a chance to breathe if its pores are not completely clogged with débris; they keep the pores active and promote the elimination of wastes. But more than this, they have a most soothing and at the same time invigorating effect upon the nervous system, particularly when the air is cool or cold.

The direct contact of the air with the innumerable nerve end-organs located in the skin has a most refreshing influence. For this reason it is especially advised for those suffering from nervous disorders, or having any nervous tendencies, to devote themselves faithfully to air bathing. It would be

very beneficial for such sufferers to take two or three extended air baths each day. It would be still better if they could so locate themselves that it would be convenient to avoid the wearing of clothing at any time of the day or night until a normal condition had been established. To have the skin continuously exposed to the air would do much in itself to reduce or entirely correct neurasthenia and allied complaints.



The air bath calls for the exposure of the entire nude body to the air. This contact of the air with the innumerable nerve end-organs in the skin has a most refreshing effect.

The duration of one's air baths will depend more upon convenience than upon any other factor. They should continue as long as possible. If this means all day, so much the better. There are many people who could and would take prolonged air baths if they but knew the value of them, or if they thought about it. If the human body were considered in the proper light, and not as something offensive or lewd many entire families could secure day-long air baths many times each year when in the confines of their own homes undisturbed by an unsympathetic audience.

Duration of Air Baths

Everyone should try to take an air bath of at least half an hour each day. This may or may not include the time that one is taking one's exercise, though it is particularly important that part of one's exercise be taken nude, because of the increased perspiration induced by exercise and because one

will enjoy the movements more fully when thus unhampered. It is also a good practice to take the dry friction bath, referred to later in this section, in conjunction with the exercises and the air bath. But if one takes the air bath alone friction is particularly beneficial with it.

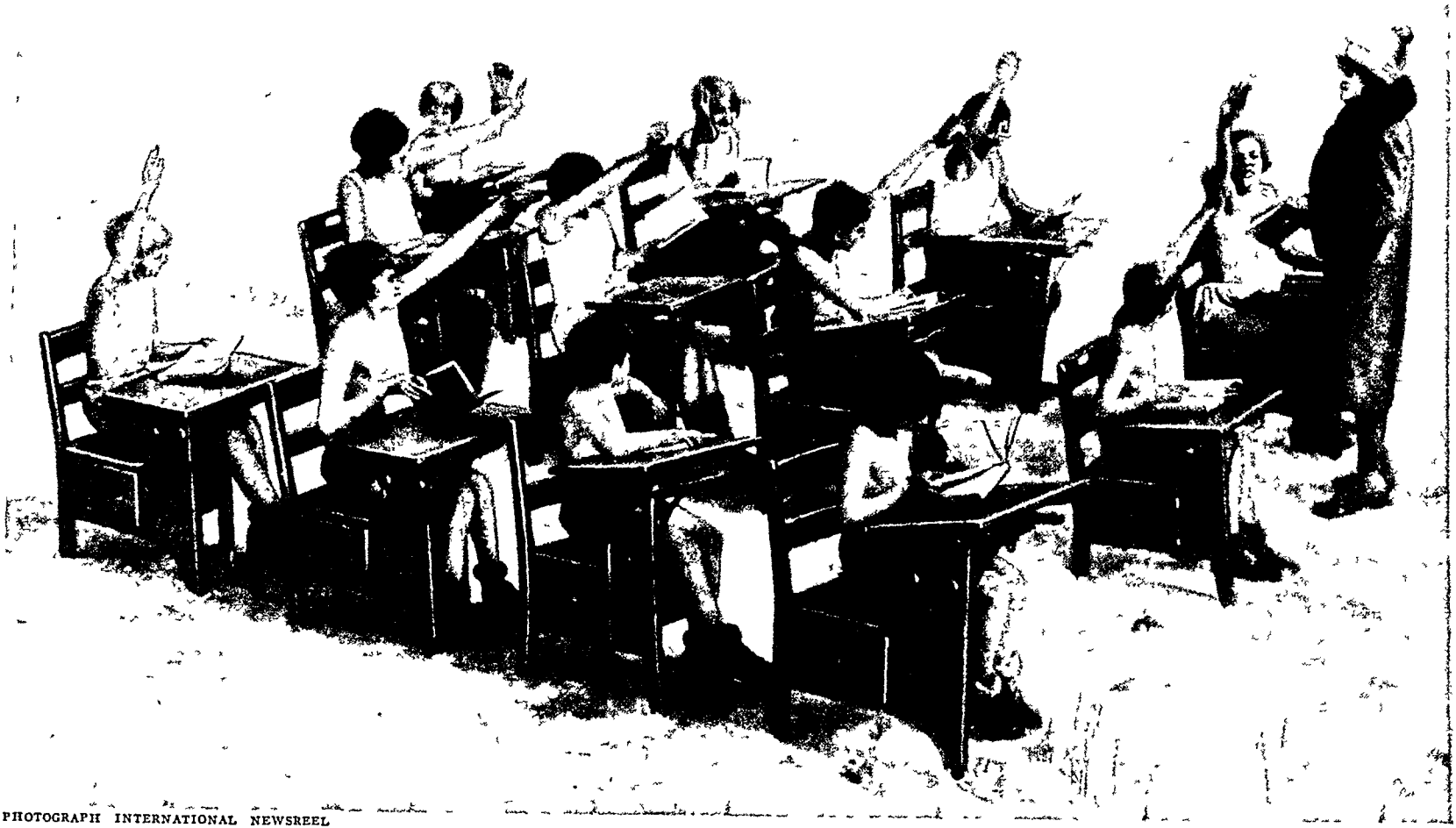
One of the main benefits of air bathing comes from the contact of the blood with the skin. Friction brings more and more blood into the blood-vessels of the skin, and it also brings about, both directly and reflexly, a dilation of the blood-vessels. Thus larger amounts of blood reach the skin surface. This is of particular value in cases of fever, since it brings about the loss of some of the excess heat from the fevered blood. There is some reduction of temperature through the mere exposure of the skin to the air, but by maintaining skin circulation and warmth through friction this reduction can be greatly increased.

Benefits of Air Baths

The more pure air one can get for the air bath the better. The windows should be open but just how far open will depend upon how cold the air is, the direction and force of the wind, and how much cold one can endure with comfort and good reaction. It is essential that the body be comfortably warm, with the blood in good circulation. If the room is very cold this warmth may be achieved by exercise, either mild or quite active, according to requirement and physical condition. The colder the air the more invigorating it is, for cold air has something of the effect of cold water. However, the body can endure an air bath much colder than a water bath, just as one can endure an air bath at a much higher temperature than that at which a vapor bath can be taken. The cold air has the effect of increasing the heat production in the body.

Temperature of Air Baths

Anyone who can take an air bath in zero temperature will find it very stimulating. In such an atmosphere, however, the bath should be of short duration, and it would not be advisable for the man or woman of less than average strength or resistance to attempt it. Sufficient benefit will be secured from air baths at moderate temperatures. When the outside temperature is at zero or thereabouts the warmth of the ordinary living room will temper it as it comes in at the window, thus providing an air bath at moderate temperature.



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PLATE 69. Air baths in the costume and surroundings here featured are unquestionably rigorous. Yet, alternated with rigorous exercise and taken under conditions that permit sun-bathing, they are a part of the regimen followed by tubercular children at an American sanitarium.

One should not think that only cold or decidedly cool air is beneficial. The warm air of summer will prove to be tonic in effect, also. And whether one be extremely vigorous, of average vigor, or more or less feeble, summer air bathing should be indulged in whenever opportunity offers. Air is tonic under practically all circumstances, perhaps even when the outdoor air and temperature are above one hundred and twenty degrees. If, in approximately such a temperature, one can alternate air baths with water splashes or baths of some kind as cold as can be secured, they will be still more beneficial.

Air and Water Baths

For the same reasons that air baths are beneficial, exposure to the wind is beneficial. Wind is merely air in motion; but like the wave on the beach, or the water from the douche hose, it has a more tonic, bracing effect than the same medium at rest. It is the action of the winds which keeps the atmosphere of the earth pure, and these winds are beneficial in every way. When you go out on such a boisterous day that the wind blows through your clothing as if it were mosquito netting, you will find the effect both physically exhilarating and mentally thrilling. In fact, whether the air is free from motion, or passing in mild zephyrs or breezes or powerful gusts of wind, as much of it as possible should reach the surface of the body.

As stated elsewhere, one should endeavor so to clothe oneself that there will be as little exclusion of air from the skin as possible. If one dresses as lightly as possible and as lightly as one should, one can enjoy an air bath at practically all hours of the summer, at least, even when clothed, and in the winter when out of doors. Fabrics which are of such material, or are so closely woven, as to exclude air should be avoided. This is why linen, or even cotton, is preferable to wool for underwear; wool interferes more with passage of air than do the former fabrics. Those who cannot overcome the prejudice against nudity, especially in association with others, may go about their homes in the lightest possible fabrics made into flowing robes, or loosely fitting garments, perhaps on the order of pajamas, which will allow the air coming through the windows that *should* be open to reach the body.

Dressing to Secure Air Bath Daily

Some of the conditions in which air baths are to be especially recommended are general catarrhs, defective circulation, chronic head conditions, enervation, herpes zoster (shingles),

hip-disease, hives, hypochondria, hysteria, incontinence of urine, some forms of insanity, locomotor ataxia, jaundice, plethora, purpura, rickets, ringworm, scleroderma, seminal losses, masturbation, smallpox, thyroid deficiency in children (cretinism), Pott's disease (of the spine), all skin affections, sterility, syphilis, all toxemias, pulmonary tuberculosis, bone tuberculosis, leucorrhea, whooping-cough, and both simple and pernicious anemia, and to control fever.

Whenever possible it is advisable to make the air bath a sun bath as well. If this cannot be done, then by wearing clothing light in color and no heavier than is necessary, one can get much of the benefit of a combined air and sun-bath. See *Sunlight*.

AIR DOUCHE.—This bath may be called the fan-bath also. It is an air bath taken in the current of air created by an electric fan, or by waving a towel rapidly, either the entire body or a portion of it being exposed. This is essentially a cold-air-bath. It has excellent tonic effects, but is also used for reducing fever. For a tonic air douche, vigorous friction is administered by two attendants while the body is exposed to the cold blast from the fan. In case of fever, when it is desired to reduce a high temperature to a more comfortable and safe degree the skin may be moistened by the wet hands of the operators, by sprinkling, or by placing a wet sheet over the body.

Air Douche



The air douche, which may be called a fan-bath, is essentially a cold air bath, and is effective as a tonic.

The hot-air douche is frequently used with good effect in erysipelas.

ALKALINE BATHS.—There are numerous resorts over Europe and America whose popularity is due to the gratifying effects derived from contact of their mineral waters with the skin of the patrons who bathe in them. The majority of these patrons are not aware of the fact that the same effects can be secured in their own homes and in their own bathtubs, simply by adding to the bath water at a neutral temperature from four to twelve ounces of sodium bi-carbonate or potassium bi-carbonate. Skin affections are greatly benefited by these alkaline baths, and they are also very useful to relieve the severe itching associated with jaundice and hives. The same alkaline solution for local applications may be made by adding half an ounce of either of the salts to a quart of water. The local applications are serviceable in hives and some other skin affections, especially eczema.

Alkaline Baths

The *hot alkaline sponge bath,* with water as hot as can be borne (up to 130 degrees or even higher), will relieve the itching of hives or from any other cause when there is no eruption. For this bath add to one pint of water a teaspoonful of ordinary sodium bicarbonate.

ALTERNATE HOT AND COLD APPLICATIONS.—In the use of alternate hot and cold applications to restricted areas of the skin we have one of our most powerful aids to improvement of local circulation, not only in the skin but in the organs and structures associated with the skin area. Each application is alternated every so often. That is, after the initial hot application has been in place for several seconds or minutes, it is removed and a cold application given, which is supplanted by another hot application within 15 to 30 seconds. This alternation between hot and cold is continued for the duration of the treatment, the last application being always a cold one. Sometimes the hot application continues for twice or several times the duration of the cold, but the duration of each is adjusted to suit the condition.

Alternate Baths and Circulation

By the alternate contraction of the internal blood vessels of the local area by the cold, and the dilatation of these vessels by the heat, the organs affected may be alternately more or less drained of blood and pumped full again. The heat each

time renews the response of the skin nerves somewhat depressed by the cold, and the alternation may be continued almost indefinitely with the same results. This procedure always begins with heat and ends with cold. The treatment is excellent in many acute and chronic affections, in long-standing cases of passive congestion and it also rapidly aids in eliminating poisonous deposits and exudates, and also when organs are "lazy" in their functioning. See also *Alternate Compress* and *Revulsive Compress,* both under *Compresses;* also *Fomentations.*

Ascending Douche



The anal, or ascending douche, is simple in its equipment and application. For home use the best appliance is the portable hand-spray, which is attached to the bathtub nozzle.

ALTERNATE COMPRESSES.—See under *Compresses.*

ANAL DOUCHE.—This is often called the ascending douche, also sometimes the bidet. It may be considered that there is a difference between the ascending douche and the anal douche, but this is merely in the matter of the area to which the application is made. The nozzle used is often such that the spray or stream of water cannot be strictly localized. For home use the best appliance for this application is the portable hand spray, this being attached to the bathtub nozzle and used while the individual is squatting in the tub or suspended crosswise so that the hips are somewhat down in the tub, the weight supported by the knees over one side of the tub and the back resting against the other side. The spray is directed upward against the anal region and perineum—that firm body of tissue between the external sexual organs and the anus. The spray may be at any

temperature, depending upon the condition and the effects desired.

Used with a cold spray, the anal douche is very valuable in hemorrhoids and constipation, gas due to constipation, and weakness of the anal sphincters that allows escape of soft or liquid bowel waste without control. Applied more generally to the perineal region, the cold spray is excellent in case of prolapse of the uterus or rectum. When there are spasms or painful conditions in the internal pelvic or abdominal organs the cold ascending douche should not be used alone. Applied very hot, especially when very hot alternates with very short cold sprays, this is a beneficial measure in cases of pain and irritability of the pelvic organs, including the bladder, of either sex. Chronic prostatic enlargement is benefited by the alternating ascending douche, as also is chronic thickening of the spermatic cord about the testicles. Very hot douches are of service in relieving that well-nigh intolerable itching of the anus and vulva from which so many suffer. In fact, this is a form of hydriatic treatment that should be used much more commonly than it is. That it has not been so used is due partly to the fact that its benefits are not generally known, and partly to the idea that a special appliance is necessary.

Anal Douche, Uses of

BANDAGE, DRY ABDOMINAL.—See *Abdominal Bandage, Dry.*

BEDROOM BATH.—One may take a cold bath in one's bedroom in one of three principal ways: by the use of the hands alone or with a wet scrubbing brush, or with a cold wet towel. Of course, one may take hot baths by the same methods, if other facilities are unavailable, but because of their very nature they cannot be fully satisfactory for the application of heat.

The first and second methods of taking the bedroom bath—with hands or brush—will be more enjoyable to some people, the third method to others, but the last is the best method when splashing must be avoided. A good tonic bath may be taken with no other equipment than an ordinary wash-basin, though the addition of an absorbent bath-mat or at least a rubber bath-mat or rubber sheet is an advantage.

When Bath-Conveniences are Missing

Upon jumping out of bed in the morning (the best time for this bath, though naturally not the only satisfactory time), dip both hands in the basin of water, which should have been

prepared the night before if there is no running water in the room, and bring up several handfuls of water directly to the face. The effect of water applied in this way is very different from that of merely rubbing the face with the moistened palm and much more enjoyable. Now take as much water as the hand will carry and apply it around the neck with some rubbing. Then scoop up water with the right hand, taking it up the left arm over the shoulder and into the armpit. Do the same with the left hand over and under the right arm. Then bring several good splashes over the chest and trunk, working the hands around the back and wetting that part as much as possible. Give each leg a rub upward from the ankle to the hip with as much water as it is convenient to use. Now, if the bowl is portable, place it on the floor, squat over it, and give the lower abdomen, loins and external genitals as quick a splash bathing as possible. Finish by dipping each foot in the basin and quickly rubbing it from toes to heel. Follow this excellent bath with a vigorous hand or scrubbing brush application followed by a rub-down, taking care that the body is thoroughly dried and that reaction is prompt and complete. Exercise in the nude before dressing if convenient, especially if reaction is tardy or incomplete. This bath may be taken with the basin on the floor if desired, or, except for the final part, on a chair or on a suitable table. The other method of taking the bedroom bath is described under *Towel Rub, Cold.*

Method of Taking Bedroom Bath

BLANKET PACK, HOT.—A blanket pack is always applied hot, never cold, and consists merely of wrapping a patient in a woolen blanket wrung from as hot water as his skin can stand comfortably. It is applied as follows:

Hot-Blanket Pack

On a suitable bed or couch, with firm mattress, a rubber sheet is spread so as to extend over a pillow placed at the head. Over the rubber sheet three or four woolen blankets are placed, these also covering the pillow. A final blanket is wrung from water at high temperature (155 to 165 degrees), and spread quickly upon the dry blankets. The patient, free from all clothing, places himself upon this, and the various coverings are quickly wrapped about him. See *Wet-Sheet Pack* for method of applying. It is advisable that some heating medium, preferably hot-water bottles, be placed at the feet, for the effect of the pack is to supply heat to the body and

stimulate the circulation, often to induce marked perspiration. After a very brief time at the start the pack becomes in effect a vapor bath, the body being enveloped in vapor held about it by the rubber sheet.

In old age and cases of extreme weakness the hot-blanket pack is sometimes better for producing increased skin activity than the cold wet-sheet pack. It is more convenient to apply and often more comfortable than a full tub bath. In cases of chill it often proves useful. There are other occasions, also, where it is necessary or advisable to produce sweating quickly. Among these are acute infections. In such cases, instead of the cold-sheet pack, the hot-blanket pack will be beneficial. Its effect is almost immediate, but great care must always be taken not to allow it to continue too long, as it then becomes exhausting and depressing.

This is a good procedure for preparing the body for some cold application, though, if used for such a purpose, the patient must be removed quickly when the body has become warmed, and the cold bath given without delay. As a rule this pack is preferred by patients to the cold wet-sheet pack, with its initial and unpleasant cold shock. But because of the feeling of comfort it gives there may be the inclination to repeat it often enough to produce a pronounced atonic effect.

The hot-blanket pack gives very good results in the treatment of many diseases, some of which are carbuncle, chills, cholera, delirium tremens, dropsy of pregnancy, beginning of fevers, glanders, hay-fever, inflammation without fever, joint affections, acute Bright's disease without fever, dropsy of the kidney, acute yellow atrophy of the liver, hydrophobia, lymphangitis, malaria without fever, first day of measles, first day of meningitis, milk-leg (applied to leg and abdomen), multiple neuritis, ptomaine poisoning, tetanus, chronic alcoholism, extravasation of urine, muscular rheumatism, peritonitis and lobar pneumonia.

Brand Bath

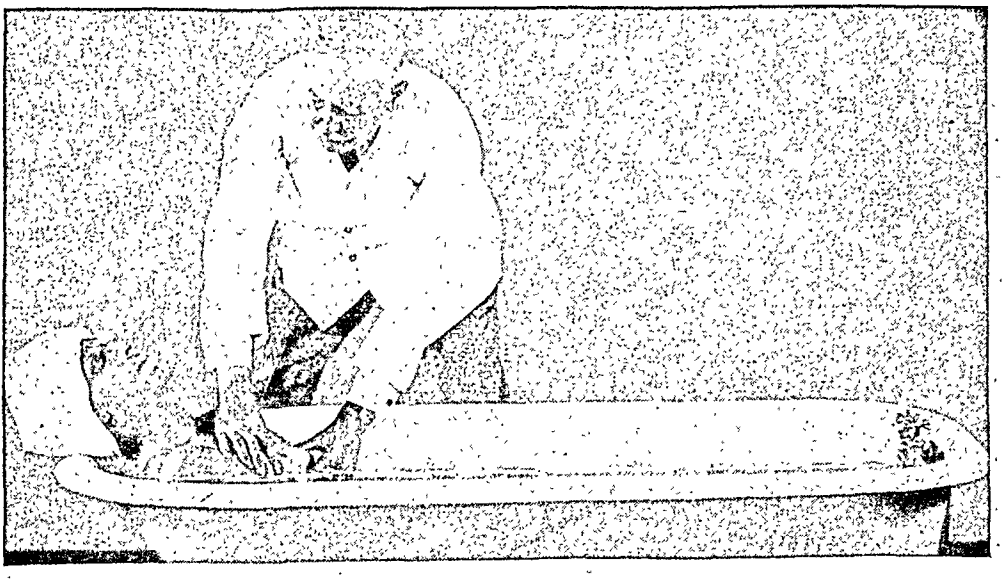
BRAND BATH.—The Brand Bath, much used in typhoid fever, offers an excellent illustration of the value of hydrotherapy in toxic conditions. According to the direction of Brand (Ernst Brand, a German physician of the past century), the full bath should be given and repeated as often as necessary, when the rectal temperature reaches or exceeds

103 degrees. When possible a portable bathtub should be used, this being brought to the bedside so that the disturbance of the patient is reduced to the minimum. The temperature of the water used is about 78 degrees (from 55 to 78 degrees).

The patient's face and chest are first sponged with water much colder than the bath water (about 50 degrees), then he is quickly immersed in the tub by attendants, up to his chin. A cold wet turban is wrapped about the head, preferably so arranged that it forms a trough down the neck. While he is immersed the attendant rubs him vigorously for three minutes or less, avoiding the abdomen; after which he is placed in a sitting position for a few seconds while two or three gallons of water at 50 degrees, are poured slowly upon his head and allowed to run down the turban trough to the neck and upper back. He is immersed again and the rubbing is repeated for five minutes. Again he is raised and the pouring repeated, after which follows another immersion with friction. It is sometimes necessary to shorten the bath, but usually it should be repeated every three hours if the temperature rises to the indicating degree.

Method of Taking Brand Bath

Between these Brand baths cold abdominal bandages should be applied, with as frequent changes as are necessary.



In the Brand bath the patient is immersed while being rubbed vigorously for two or three minutes by the attendant or attendants. This bath is of special value in treating highly toxic conditions such as typhoid fever.

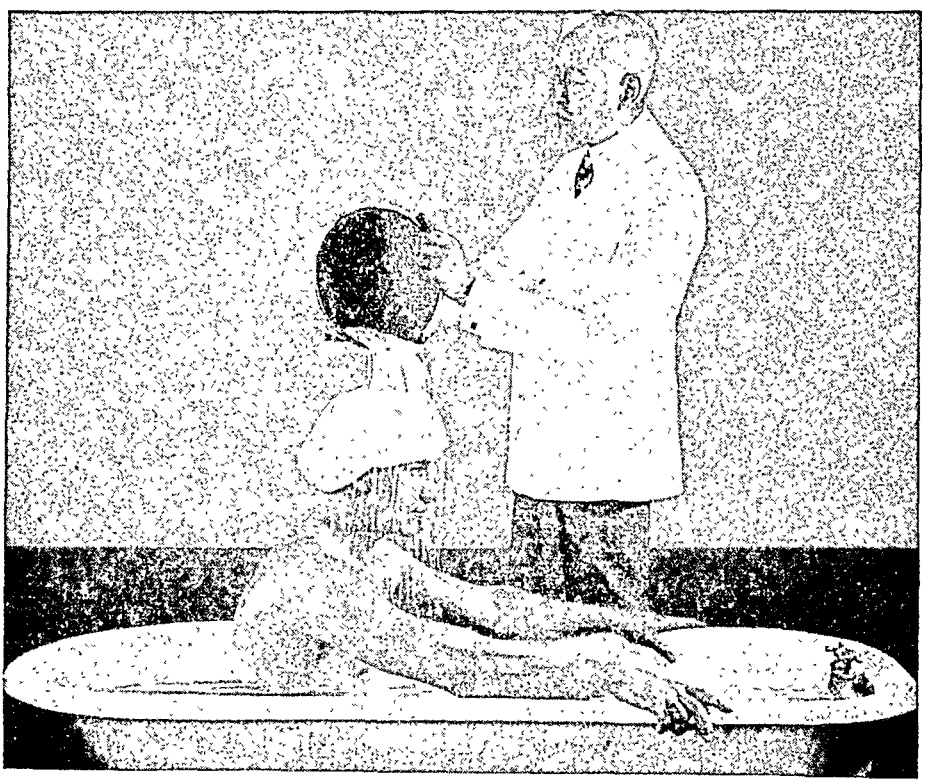
The Brand bath can be used with excellent results in other febrile conditions, especially typhus fever.

In some cases where this treatment cannot be applied, cold regional affusions may be used. In many cases prolonged neutral baths with rubbing are effective, with cold affusions to the head, neck and chest every three minutes during the bath.

In conditions of debility, subnormal temperature, heart lesions, pregnancy, tuberculosis of the lungs, and arteriosclerosis the Brand bath should be avoided and some other hydriatric procedure employed in case of typhoid fever. Neither is its use advisable in any condition of marked inflammation of internal organs, nor in infancy, old age, when there is poor reactive power, or when there is either sweating or shivering.

Brand Bath—Contra-indications

CABINET BATHS.—See *Hot-Air Cabinet Bath,* and *Vapor Bath.*



After the patient has been immersed and rubbed as described in the Brand bath, he is placed in a sitting position for a few seconds while two or three gallons of water at 50 degrees are poured slowly upon his head. Of course, the patient, if in no condition to support himself at the time, must have everything done for him.

CLEANSING BATH, WARM.—See *Health and Bathing.*

COLD BATHS IN HEALTH and HOW TO TAKE THEM. See *Bedroom Bath; Plunge, Cold; Shower Bath or Rain Douche; Sitz Bath; Sponge Bath.*—Cold water, like cold air, is highly energizing. If we avail ourselves of its benefits we can increase the vitality and hardihood of our bodies. Perhaps more than any other one agent the daily cold bath increases the vitality, tone, health, and reactive powers of the skin. By increased cutaneous activity and the increased circulation of the blood not only in the skin but throughout the body, cold or cool baths prepare one to withstand external cold with less discomfort and, in fact, with a positive feeling of still greater vigor. Thus one develops the ability to laugh at colds, coughs, catarrhs, pneumonia, and many other ailments which are constant bug-bears to those whose skin is not trained to endure and react to cold.

Cold Baths in Health

It is necessary, however, for those who take such baths to know something of their individual requirements and powers of resistance and reaction to cold, not merely that they may get the best results but that they may also avoid doing themselves harm. What may be endured and enjoyed and produce good results in one may not be at all suited to another of less vitality, as pointed out earlier. Those who are strong may be able to plunge into very cold or even icy water at almost any time and under a variety of conditions, and emerge with a sensation of exhilaration and delight. But the man with poor circulation, who is endeavoring merely to increase his strength and vitality, should pause before he attempts to emulate the heroic example of his stronger and more full-blooded and warm-blooded friends. He should proceed intelligently. His purpose should be to gain as much benefit as possible from his efforts, and not to tax his endurance to its limits.

Cold Baths, When to Use

It is advisable to mention here that any reader desiring to prove the truth of the claims made for the benefits of cold bathing, or desiring to develop a normal, powerfully reacting skin for its own sake, should not begin at once with fully cold baths if these have not been taken before. Graduation of tonic baths is necessary for the majority of people who have neglected this health measure. It must also be mentioned that an early effect of cold or cool baths is very likely to be an

increase in catarrhal discharge, or the development of such when there has been none. In many cases also, there will be all the evidences of a cold. These results are due not to any harmful effect of the cold bath, but to increase in the resistive powers of the body, whereby they are enabled to throw off many wastes and impurities that had been accumulating. These effects are highly desirable, and when they have subsided it will be found that the body will be in a far better condition of health, which will be revealed by a feeling of increased vigor.

Effects of Daily Cold Baths

By reflex action the daily stimulus to the skin of a cold or cool bath affects the processes of digestion and assimilation; the necessary secretions are increased in quantity and quality; and the increased activity of the circulation strengthens the digestive organs by the conveyance of more and better blood to them. Furthermore, by the same reflex action the tone of the musculature of the digestive organs is increased, as is that of all the involuntary muscles of the body. Through these effects nutrition is made more normal. Assimilation is increased in those in whom it has been defective and who, in consequence, are below normal. Those whose assimilation has been above normal and, who in consequence, are above normal in weight, may be aided in reducing by the increased activity of the skin, in conjunction with proper diet and exercise.

Tonic Baths

Every robust child should have his daily tonic bath, though many experts think that it is necessary to exercise great care in infancy and, in fact, until the child has reached the age of seven or eight years. Experience has proved that there will be no injury to even the youngest infant, but, instead, a decided benefit, from tonic baths properly given. The writer has known of many infants to whom daily cold baths were given regularly from the day of their birth. But these baths have usually been the sudden quick affusion or pouring of a considerable quantity of water over the body, so that the shock did not last more than one or two seconds. The force of the water itself, by this form of bath, is a powerful aid to reaction.

Cold Baths for Infants

Naturally, if the infant is sickly or feeble, it will be much better to begin with a warmer or moderate temperature and slowly to reduce to a cool or cold one as a better state of health is gained. It is not *necessary,* in fact, to give a really

cold bath to an infant or small child. As good results will be obtained by using cool water. Any temperature below neutral will be tonic to young children, though the lower the temperature, within reason, the more tonic will the effect be, if the vitality is good and reaction prompt and complete. This does not mean that a rural mother should break the ice in a wash-basin every morning to give her infant, or even her child of several years, a bath. There are different degrees of cold, and it should be remembered that to infants and young children water does not need to be far below neutral to seem cold. The cool wet-hand friction bath is generally the best of all baths for little children. By this application the tonic effect of the lower temperature is secured, yet the warmth of the hand of the mother or nurse will greatly reduce the shock and hasten reaction. Whatever form the bath takes, it should be given quickly and followed immediately by perfect drying to insure freedom from exposures that retard reaction.

The Growing Child and Cold Baths

For growing boys and girls, especially as the period of puberty arrives, the cool bath is beneficial, in that it healthfully stimulates all normal functions and promotes all healthful secretions and functional processes. It will largely prevent or cure so-called "growing pains," and at the same time prevent the establishment of the nervous conditions that so often develop at this time. Such children may often take fully cold baths with especially good results, provided the natural temperature of the water is not below 75 degrees—as in summer and later spring and early autumn in temperate zones, and nearly all the year round in the warmer zones.

If nervous symptoms already have become manifest, such baths may be beneficial if the nutrition is normal; but, in case of subnormal weight and anemia, it would be better to begin with more temperate baths and reduce the temperature a degree or two every two or three days as the general condition improves. As with all other measures of treatment, for health or for the correction of disease, the temperature and duration of cold or cool baths must be adapted to the individual case. It is always advisable to give some consideration to the feelings or desires of the individual, for, if there is a pronounced antipathy to cold baths, there cannot be such good results from their use as from more temperate ones.

Most adults are able to take cold baths in some form to advantage, and should not too hastily conclude that they cannot do so. Only after careful trial can one determine the lowest temperature at which a bath can be taken with full enjoyment during and after, and with full reaction and benefit. Sometimes, however, it may be advisable to ignore a lack of enjoyment *during* the bath, in order to derive greater benefit than would follow one of a more pleasurable character.

Cold Baths and Sedentary Habits

To immerse the body in a bathtub of cold water is not always either practicable or wise, even for a reasonably vigorous and healthy person. But there are few who cannot take every morning with advantage a cold rub-down with wet hands or towel, or a cold splash or shower or spray bath. Several methods of taking the cold bath or its equivalent will be explained later. The tonic influence of the cold bath is especially needed by men and women whose occupations are sedentary; and yet if they are not healthy, if their vitality is depressed, if their nervous energy is low, if they have a pronounced anemia, or if their skin is inactive and lifeless, it is always better to precede the cold bath by a hot bath of from two to four minutes' duration, or to begin with tepid baths and progressively lower the temperature as the reaction improves.

In case of such disorders as Bright's disease, neurasthenia, rheumatism, gout, gravel and heart disease it is better to take the cold bath with caution or, in other words, only after progressive "training" has made it possible and safe, though its proper use will usually be of the greatest possible benefit. In these cases the progression from cool to cold should usually be somewhat more slowly accomplished than in other affections, and in the case of organic heart disease it is often important to refrain from the fully cold bath entirely, using reasonably cool water only. In the other cases mentioned the water may need to be tempered so as to prevent a severe shock, throughout the course of the illness. In the case of all feeble individuals it is far better to apply the water with friction, sometimes with the aid of the scrubbing brush, over a small part of the body at a time, than to immerse the whole body at once.

Cold Baths and Disease

It is the *reaction* to the cold bath that is the important

thing, not the cold bath itself. Therefore, unless one secures this reaction it is better to avoid such baths entirely. (See *Reaction or Recuperation.*)

Duration of Baths

Neither as a general thing, should one continue a cold bath or a cold application longer than necessary to secure reaction, which means a few seconds in most cases, or a very few minutes in many cases. The average man and woman will secure far greater benefits from cold bathing if strict brevity is observed. To remain in the bath after it has accomplished its purpose may result in paralyzing the reactive powers, and in reducing the body heat to an undesirable and harmful extent.

There are certain conditions which are favorable and some which are unfavorable for cold bathing. One of powerful physique, with as powerful vital organs, may need to give little consideration to any of these, for he would profit by cold bathing under almost any conditions. With training to prepare for it, he could take an open-air cold bath in winter, even if it were necessary first to cut a hole in the ice for the purpose, and make himself even more hardy and vigorous by the experience. The writer has known men who have made a practice of bathing in just this way all winter long. However, even the most vigorous man would be foolhardy to attempt such bathing if he never had taken cold baths. And it is doubtful if such extreme measures are ever necessary to develop the ultimate degree of hardihood.

Tempering the Cold Bath

For anyone who is delicate or who is doubtful of his recuperative powers, especially if these have never been strengthened through systematic cold bathing, it is highly advisable at the start that the cold bath be taken in a reasonably warm atmosphere, even though one may have just concluded taking one's exercises in a room at outdoor temperature. It is much easier to get the reaction and to enjoy a cold bath in a warm room, and for the beginner this is an important fact to bear in mind. It is equally important to remember that this is a matter that depends upon the individual, his strength, vitality, and reactive powers. Many times a weak individual will be too "brave," and as a result injure his health by taking too cold baths, or baths in an unfavorable atmosphere. On the other hand, a really strong individual may imagine a great deal of unpleasantness about cold bathing that he would not

experience, and therefore deny himself not only the invigoration of cold baths but genuine pleasure in taking them.

The temperature of the water must be adjusted not only to the varying needs of different individuals, but to the varying needs of the same individual at different times. There are times when one can recuperate much more quickly from a cold bath than at others. Providing one fully recuperates, the colder the water the more invigorating it will be. The beginner, however, should content himself with cool water at first. If one is delicate, it may be very necessary to have it only tepid. In either case, the temperature may be gradually lowered as one's circulation and reactive powers increase and as one gains in strength, until there has been developed that degree of vigor which permits one to take with delight baths as cold as water comes from the faucet, whether this be fifty or forty degrees or even lower.

Reaction to Cold Baths

This gradual lowering of bath temperature does not mean reducing the temperature of the water while in the bath. There are times when such reduction is employed, but only in the treatment of some abnormal condition. See *Graduated Bath,* under *Full Baths or Immersion Baths.* The lowering of the bath temperature means using water on successive days, or every two or three days, a degree or two lower than that used during the preceding bath. Often, in fact, it is necessary to use each lower temperature for a number of days. This is particularly true with feeble or anemic or emaciated individuals, or those with lifeless skin or deficient reactive powers.

If one begins cold bathing in the summer months, it is comparatively easy to take baths as cold as the water runs from the faucet at the beginning, and then to continue taking them as the days become colder. If one has been able to secure cold baths for several weeks of summer, one should be in such "training" that the progressively colder water of autumn and then of winter may be used with comfort and enjoyment and with great benefit. This is an excellent manner of lowering the bath temperature. Let Nature do it for you. However, from these remarks do not conclude that one should wait until summer before beginning cool bathing with cold baths in mind for the future. Whenever one becomes converted to the idea of the cool or cold bath as a means of

Seasonal Graduation Bath Temperature

increasing vitality and hardihood, such baths may be begun, even though the time be mid-winter, providing one goes about it in the right way.

Many people take colder baths than they should for their condition, then stand before a fire or radiator, or use some other form of artificial heat, to bring about the reaction their own powers fail to provide. Cold bathing under such conditions will not be sufficiently beneficial to justify its use. Such artificial heat brings about an atonic reaction, as do all hot applications. It would be far better to take very moderate baths and have the reaction come about naturally through response of the vital mechanism governing reaction. This does not apply to bathing in a warm room. It is necessary that the skin be warm before taking a cold bath, and this is more likely to be the case when the room is warm. But artificial heat applied to the surface warms the skin and brings the blood to the surface from the interior through no increase in heat production within the body. Hence it cannot be invigorating and bracing. However, if one *has* taken a bath too cold for normal reaction to take place, it is better to bring about warmth of body by artificial heat than to remain cold. After that the temperature of the bath water should be tempered so that such artificial warming will not be necessary.

Body Warmth before Cold Bath Important

A very important condition governing reaction is that one should be thoroughly warm before taking a bath. For this reason a good time to take the bath is immediately after jumping out of bed in the mornings, provided the place of bathing is conveniently near and at the proper temperature so that there will be no chilling of the body between the time of arising and entering the bath. For the same reason it is usually advantageous to take the cold bath after active exercise, when one is warmed through and through with the natural heat of the body.

There is an old theory that one should never take a cold bath when the body is very warm. But the supposed dangers of this have been greatly exaggerated, to say the least. If there were any truth in the theory, it would be detrimental to summer bathers to jump into ocean, lake, or river, for in many cases the bodies of these bathers are very warm without any exertion whatever, while the water may be at such low tem-

peratures as to cause a distinct shock to whoever enters it. There would also be considerable detriment to health in taking the Turkish or Russian bath, either of which is followed by a cold application.

It is true that a chill following an overheated condition is likely to disturb the internal harmony of the body, causing serious congestion and subsequent trouble, but a cold bath, taken properly, will not produce chill, even when one is overheated. If short cold applications invariably produced a chill or detrimental shock, the remarkably favorable effects that follow the pouring or dashing of cold water on those in collapse from undue exposure to excessive heat would be impossible. Prolonged immersion in cold water after being over-heated would produce chill and serious congestion, but no one who knows even the A B C of cold bathing would make such a mistake.

Previous Warmth and Reaction to Cold Bath

When the body is very warm it is better able to withstand the application of cold water than when it is cold or chilly; for not only is there an excess of body heat which can be dispensed with, but the heat-production forces are functioning at an unusually high rate, the nerves are capable of more vigorous response, the circulation is speeded up—in fact, all factors concerned are favorable. However, even in very vigorous people, the body heat may be so raised by active exercise as to require such extended applications of cold to reduce it to normal that there will be exhaustion of the nerve centers, with failure of reaction or incomplete reaction.

It is never advisable to take a cold bath when there is a feeling of chilliness or when the hands and feet are cold. Cold water may be useful in such cases, but not in the form of a general cold bath. If one is ready for the bath, or if it is time for the bath, and the body has not that degree of warmth required to make a bath a pleasure as well as a benefit, time should be taken for sufficient exercise to produce the necessary warmth. In such cases it will be found that the body can be warmed by rope-skipping, stationary running, or tensing exercises more quickly than by ordinary free-arm movements; for those of limited strength, however, these latter are better, as are also club-swinging, dumbbell exercises, and self-resistive exercises. In the case of feeble people there should not

be sufficient exercise to bring about marked perspiration, as this would require such an expenditure of energy that there would not be enough left to insure beneficial reaction. Neither, in any case, should there be, as pointed out above, enough to produce excessive heat.

It should be borne in mind too that when sufficiently vigorous exercise has been taken to create excessive or pronounced action of the heart or lungs or both, it is best to await a reduction of their activity to more nearly normal before taking a cold bath. This usually requires only about one or two minutes if one is in good health, and during this time the warmed body should be protected from loss of heat by a robe or blanket. Sometimes it is beneficial in such cases to take a brief warm bath immediately after the exercise. This bath should not be hot, nor should it be continued longer than necessary to bring about approximately normal action in heart and lungs. The cool or cold bath should then be started at the desired temperature without any "sliding down" from the warm bath.

Cold Baths after Vigorous Exercise

After exercise vigorous enough to produce free perspiration, it is usually best to rinse off this perspiration with warm water, or even with a very short application of moderately hot water, before using the cold. This is most conveniently done by means of a shower bath, but of course it may be done with equally good effect by means of a portable hand spray or a sponge or splash bath, or perhaps in the ordinary tub. When one regularly perspires profusely in one's daily exercise, it will be found that thorough rinsing of all perspiration from the body with warm or moderately hot water just before taking the cold bath will answer all the demands of bodily cleanliness and will make unnecessary, for the most part, the warm soap baths usually taken. There is no objection, however, to using soap occasionally with the warm rinsing bath after exercise, especially if the body has been exposed to dust during the exercise, as on a tennis court, golf links, or mat and especially if one's body has an unpleasant odor intensified by the perspiration.

Exercise after cold bathing is excellent for hastening and completing the reaction, and thus enhances the value of the bath. Some form of exercise should be taken after cold baths

by everyone who has the strength. And, if the strength is insufficient for this, there is not likely to be sufficient reactive power to make the baths very beneficial. The exercise should not be violent in any case, else the effect of the bath will be overbalanced by the undue elevation of internal temperature, which the bath and moderate exercise slightly reduce. In this instance short periods of vigorous exercise cannot take the place of more moderate exercise over a longer period. Walking for thirty to sixty minutes is the best form and amount of exercise, but any light general exercise for from fifteen to sixty minutes will be satisfactory. The cold bath should be discontinued, and drying and friction of the body should be resorted to on the appearance of such symptoms as blueness (cyanosis) of the lips, or of shivering or chattering of the teeth.

Time of Day for Cold Bath

The time of day selected for the cold bath depends upon the individual and his habits and affairs. It may be taken immediately upon arising, or just after the daily exercise whenever this may be, unless it is just before retiring, in which case such a bath might be sufficiently stimulating to interfere with sleep. At best it will not have as favorable effects as when taken at some time earlier in the day, for the reason that much of the reaction will be due to the warmth of the bed and not to the internal response. No single rule for all cases can be laid down.

As a rule, the cold bath is most satisfactory when taken after the daily exercise, when this is taken some time during the day before the evening meal. And in most cases it is a good rule to take but one cold bath each day. If one's constitutional exercise is taken the first thing in the morning, immediately afterward is a very good time to take the bath—though, if the exercise is no more strenuous than it should be, it may follow rather than precede the bath. Even if the exercise is taken at some other time of the day, it is often a good plan to take the cold bath immediately after getting out of bed, or following a wet or dry friction rub taken upon arising, in order thoroughly to awaken and arouse all the functions and activities of the body. There will be no contraindication, in such a case, to taking another cold bath later in the day, following the day's exercise period. For instance,

if one plays tennis or golf in the afternoon of a hot day, the mere fact that one has taken a cold bath in the morning would certainly be no reason for not taking another at this time.

Cold Baths and the Laborer

The laboring man, whether he be a farmer, mechanic, factory employee, or whatnot, will usually profit more by the cold bath taken upon arising than by one at any other time of the day. Such a stimulant, if one is equal to it, enables one to start the day better and to continue its labors with less stress. If one is tired but not exhausted, a quick cold bath may be used to revive the energies appreciably; but in such a case a short hot or decidedly warm bath followed by a cold one is usually better.

Dressing without drying is an excellent plan for those who have good reactive powers, especially during moderate weather. When reaction is perfect, this practice provides a brief vapor bath and increases the depurating activities of the skin, just as does the wet-sheet pack. But it naturally causes more loss of heat than when the body is dried at once, and for the average individual rubbing dry with a coarse towel is the better plan. This procedure favors reaction both through the effect of the friction and the exercise of applying it. In fact, this rubbing is very good exercise when properly done and constitutes a good part of the exercise following the bath. Rubbing and scrubbing the skin increases the movement of many extra gallons of blood through the tissues. This helps carry away poisons and brings into the tissues fresh clean blood.

Friction for Reaction

In order to get the greatest enjoyment and benefit from cold baths vigorous friction should be applied during their progress. This causes some loss of body heat, because it brings the blood to the surface in contact with the cold water; but as the cold bath is of short duration, this loss is not sufficient to reduce the reactive power and the feeling of warmth induced favors reaction. In summer, or at any other time when the body is superheated, friction during the cold bath will be useful as an aid in lowering the body heat.

COLD COMPRESS.—See *Compresses.*

COLD FRICTION MITT.—See *Mitten Friction Bath, Cold.*

COLD-MITTEN FRICTION BATH.—See *Mitten Friction Bath, Cold.*

COLD FULL BATH.—See *Full Baths or Immersion Baths.*

COLD PLUNGE.—See *Plunge, Cold.*

COLD-SHEET PACK.—See *Wet-Sheet Pack.*

COLD SPLASH.—See *Splash Bath,* and *Bedroom Bath.*

COLD SPONGE.—See *Sponge Bath.*

COLONIC IRRIGATION.—See *Enema.*

COMPRESSES.—The compress is simply the modern hydriatric application of the old-fashioned poultice, but much more convenient and cleanly, and capable of greater modification (See *Poultices*). Folded linen or soft cloths, especially old sheeting or cheesecloth, will be best for this purpose, three or four thicknesses of the linen cloths being used, or twice this of cheesecloth. Towelling can also be used for this purpose. There should be woolen flannel to cover completely the other cloths and for some cases rubber sheeting, oiled silk, oilcloth, or mackintosh, to cover all, thus excluding air and preventing loss of heat. If it is desirable to give prolonged compresses, the hot-water bottle may be used over the wet cloths or the flannel. The impervious material is not used in such cases. When cold compresses are to be prolonged, cold water may be used in the hot-water bottles. When they cover small areas, the ice-cap may be used. Compresses

There are several forms of the compress, and these will be considered below. The variations, however, are mainly a matter of differences in temperature, though there may also be differences in the mode of application.

Alternate Compress.—This is the usual manner of using alternate hot and cold applications (See *Alternate Hot and Cold Applications*), and consists merely of applying suitable cloths wrung first from hot water, then from cold—though in actual practice separate cloths are used to preserve the temperature of the water and to save time. Alternate Compresses

When boils develop, or when the skin becomes blue in the initial stages of any acute infection or condition that seems about to become purulent, alternate hot and cold compresses will do more to prevent this development, by overcoming venous stasis and bringing in large quantities of germ- and toxin-destroying white blood cells (leucocytes), than either hot or cold compresses alone. In fact, it will do more than any other measure except rapid reduction of intestinal and

systemic toxins by clearance of the bowels and fasting while drinking an abundance of water. There are numerous conditions in which these alternate applications will have a remarkable effect, so many, in fact, that it is impossible to enumerate them. Whether pain, inflammation, or congestion be in the skin, joints, bones, muscles, or internal organs, the applications will be of value in reducing the symptoms and the condition responsible for the disturbance. See also *Revulsive Compress* below.

Cold or Cooling Compress.—This is a compress with temperatures varying between 55 and 70 degrees. It should be reasonably cool at first. The more moderate compress is more suitable for inflammations in localized areas than the very cold compress. No impervious material is used over the moist cloths and flannels.

Fever and Pneumonia

In typhoid fever the cold compress applied to the abdomen is exceedingly useful. In cases of pneumonia, a similar application to the lower front chest and affected side, prolonged until reaction has been secured and maintained for several minutes, is very beneficial. In order to produce the continuous contraction of the surface vessels the compress must be renewed every five to eight minutes, for if it is allowed to



As the first step in making an abdominal compress, fairly thick linen cloths are first wrung from water and placed over the part to be treated.

remain unchanged until reaction is established, which will be within from fifteen to thirty minutes, the effect will be different—somewhat the same as with a heating compress. When intestinal hemorrhages call for constant cooling applications the cold abdominal compress is far better than the general cold bath.

When there is pain short cold compresses following longer hot ones (together making the revulsive compress), or fomentations followed by the heating compresses, are usually more satisfactory than cold compresses alone.

In case cold compresses produce a sensation of chilliness, some hot application must be given at the same time to another portion of the body to neutralize this. Thus hot compresses to the spine, or heat to the feet or lower limbs, may be supplied. Another precaution in the employment of cold compresses is to avoid such prolonged applications as to benumb the nerves of the skin. When this occurs, the influence of the nerves upon reaction is lost or greatly weakened, so that the secondary or collateral blood vessels dilate and cause deflecting of the blood into the deep vessels of some adjacent collateral area. The desired effects of the compresses will

Neutralizing Compresses



As a further step in the abdominal compress, two or three thicknesses of heavy woolen flannel are applied over dampened cloths. These must be large enough to cover more than the moist compress beneath.

for too long a period. Such applications usually should not continue longer than half an hour.

Very cold compresses applied to the face or the upper spine will prove excellent in checking nosebleed and in relieving nasal catarrh. When applied over the stomach area, ice compresses or the ice-bag will often relieve acute nausea, vomiting, and the pain of chronic inflammation and ulceration of the stomach. Cold but not intensive cold compresses applied to the supported testicles will give great relief in cases of inflammation of these organs and will also aid in reducing the inflammation. Especially when used in combination with hot compresses to the back of the chest, very cold compresses or the ice-bag, or ice itself applied to the front of the neck, will often quickly relieve an attack of asthma, provided none of the cold is allowed to reach the chest. Applied over the heart for a few minutes the cold compress is very effective in cases of cardiac insufficiency. Some authorities use it as a stimulant by allowing it to remain for five or six minutes, then removing it for about twice this period, then applying it again.

As a rule very cold compresses should not be employed in acutely painful conditions, though there are some exceptions to this—for instance orchitis (inflammation of the testicles), already mentioned, and acute appendicitis.

In some conditions the application of cold compresses to one part, with hot compresses or other heating medium applied to another part, is very effective. For instance: in inflamed ovary or Fallopian tube, very cold or ice compresses over the ovarian region are excellent even when there is pain, when at the same time the feet are in a hot bath. Very hot compresses to the middle dorsal region of the spine will overcome the undesirable effect of very cold compresses or of the ice-bag over the stomach region in painful gastritis, while allowing one to secure the beneficial effects of cold application upon the stomach blood-vessels. See *Hot and Cold Compress* below.

The same precautions regarding the temporary removal of cold or cooling compresses applies to very cold compresses only more strongly.

Evaporating Compress, Effects of

Evaporating Compress.—This consists merely of a thin compress of folded linen or other absorbent material so ap-

plied that evaporation takes place from it. Cloths about 12 inches square make the compress for most areas to be treated. Factors governing the rate of evaporation are: the amount of air reaching the moist compress, the temperature of the air, and the heat of the part to which the compress is applied. It is placed directly upon the skin, is kept moist, and has no protecting flannel. Abnormal conditions of the skin not associated with or due to severe inflammation are greatly benefited by the evaporating compress. It is, however, not sufficiently cooling for inflammatory conditions. For a cold in the head, or other acute congestion of the head or brain, it is of great value, but the hair must be wet before it is applied or it will have little if any value. In fact, the hair itself well moistened is a suitable evaporating compress for some conditions. Insomnia, when due to cerebral congestion, responds to this compress, but it should not be used if there is rheumatism or a gouty tendency.

Hot and Very Hot Compresses.—See *Fomentations;* also *Alternate Compress, Revulsive Compress,* and *Hot and Cold Compress.*

Hot and Cold Compress.—This hydriatric treatment consists in the simultaneous application of a hot compress and a cold one to entirely different surfaces. In some conditions effects can be produced by this procedure that cannot be secured by any other. No application will give the relief in some cases that can be secured by this combination. The different temperatures are employed as they are in the single compress of that temperature. The cold one must be renewed every ten or fifteen minutes, and the part to which it was applied rubbed gently with the hand or a warm dry flannel during the time of removal, while the hot one must be exchanged every fifteen minutes or so for a cold application of one or two minutes. Usually the hot and cold compresses may be continued in place, with the changes mentioned, until the desired effect has been produced—this time usually being from one to two hours, though often much less. Occasionally it is impossible to continue them to full effect.

Use of Hot and Cold Compresses

The manner in which this combination of compresses functions is this: the cold compress causes contraction of the vessels of a congested part while the hot compress (when prop-

erly applied) causes collateral veins to dilate and receive the blood drained from the other part by the cold. Following are some examples of the use of the hot and cold compress:

Very hot compress to the face and ears (but not the sides of the neck) and the *ice compress* to the top of the head and back of the neck. Sometimes the opposite combination is used, except that, while heat is applied to the back of the neck, cold is applied to the face and vertex. This application is excellent for relieving passive congestion in the brain and the headache or sleeplessness that results from this. It also aids greatly in reducing the headache of neurasthenia and of nervousness. It should never be employed when insomnia is due to anemia of the brain or when the brain is excited or irritated.

Cold compress applied from the front of the neck to the lower ribs in front while a *hot compress* or *fomentation* covers the entire length of the spine below the middle of the neck. This is excellent early in pneumonia, in hemorrhage from the lungs, in acute congestion of the lungs, and in bronchopneumonia. A modification of this chest compress is excellent in asthma: a fomentation is applied to the entire front of the chest from the collar bones to the navel, this sometimes passing around to the back as well, while a very cold compress is applied to the back of the head and neck.

Methods of Compress Application

Very cold compress over the lower third of the breastbone or sternum with a *hot compress* to the back from the mid-dorsal region to the extreme lower end. Used in acute kidney congestion connected with fever diseases. In all kidney disorders it is important that care be taken to avoid chilling when cold applications are employed.

Hot compress applied from the middle of the sternum to the navel with a *cold application* to the dorsal and lumbar regions of the spine. For disorders of the stomach, liver, pancreas, and spleen.

Hot and Cold Compress in Pelvic Inflammations

Hot compress to the lower or lumbar region of the back with a *cold compress* to the lower abdomen. Extremely valuable in all acute inflammations of the pelvic organs—uterus, ovaries, tubes, bladder, prostate, rectum, pelvic peritoneum and appendix. One-sided pelvic inflammation also may be favorably affected by using an ice-bag over the af-

fected region while the fomentation is applied as above, or while a hip pack is employed. Inflammations of the prostate and rectum may be relieved also by placing the ice compress or ice-bag to the perineum while the hip pack or a hot foot bath is employed.

Heating Compress.—This sometimes is called the local pack. It is an extremely valuable hydrotherapeutic procedure, consisting of a moist compress covered with dry flannel, sometimes with and sometimes without some impervious material over all. It is very conveniently applied to any region of the body. Its value lies in the fact that the warmth generated by the reaction from the cold application is retained by an arrangement of the outer coverings that prevents evaporation. The name of the compress is derived from the fact that, after the initial cooling and contraction of the superficial and deep vessels, there is dilation of the vessels and accumulation of heat.

Application of Heating Compress

To apply, fairly thick linen cloths first are wrung from cold water and placed over the part to be treated. These cloths should be large enough to cover the part completely, not merely a localized area of pain or inflammation. Over the moist cloths (old sheeting is excellent for these) two or three thicknesses of heavy woolen flannel are applied. These must be large enough to *more* than cover the moist compress beneath. If complete protection against heat loss is desired, a *protected heating compress* may be made by placing oilcloth, rubber sheeting, mackintosh, or some other non-porous material, over the flannel. This should be large enough to cover completely the edges of the flannel and prevent any air currents from reaching the compress beneath. When some impervious material is desired and a better one is not at hand, plain or oiled paper may be used. If any part of the moist compress comes in contact with the air, through failure to cover it completely with flannel, the good effects will be destroyed; in fact, more harm than good will result. Haphazard application of the heating compress will nullify the good that might otherwise be gained from it.

Protected Heating Compress

Very cold water usually produces the most rapid and pronounced reaction. Usually the colder the water used, the more completely should the compress be wrung out. If the

cloths are wrung fairly dry the reaction will be more rapid than if there is considerable water left in them. The other factors making for more rapid reaction are: more covering of flannel; protection by impervious material; stronger reactive powers of the patient; higher temperature of the body; better skin circulation; and smaller compress. When the skin is hot and fever present, better results will usually be secured by having only a single thickness of flannel over the compress; but when the skin is cold there should be more flannel. A feeble person may require several flannel coverings, perhaps the protected heating compress, to secure the same results that a more vigorous person may secure from merely light flannel coverings.

If tonic effects are desired, the compress should be covered lightly with flannel only and water at a low temperature used. If the effects of heat are desired, there should be several thicknesses of flannel over the compress, with the impervious material over them. Greater effect upon the circulation, in the skin and in the deeper vessels and organs will be secured by using the compress well covered, but without the non-porous material.

Effects of Heating Compress

There are many uses for the heating compress. When applied to the abdomen or trunk, it is excellent in cases of insomnia (when there is no contraindicating pathological condition), gastric and intestinal catarrh, bloating by intestinal gas, digestive troubles, constipation, bronchitis, laryngitis and numerous other disorders; and when applied locally, in rheumatism of joints and various other conditions. The *protected heating compress,* applied locally, is of much value in chronic stiff and rheumatic joints, chronic appendicitis, chronic inflammation of the ovaries and tubes and insomnia due to anemia (applied to the scalp). Applied to the spine, it is valuable in nervous affections of the extremities, general spinal irritability, and hyperacidity of the stomach secretions. When employed about the trunk, it renders good service in abnormality of liver function, painful peristalsis, catarrh of the intestines, ulcer of the stomach, ascites or abdominal dropsy and peritonitis. When applied to the trunk the moist cloth often does not encircle it, but it may be applied to the abdomen only, while the other coverings encircle the trunk. Ap-

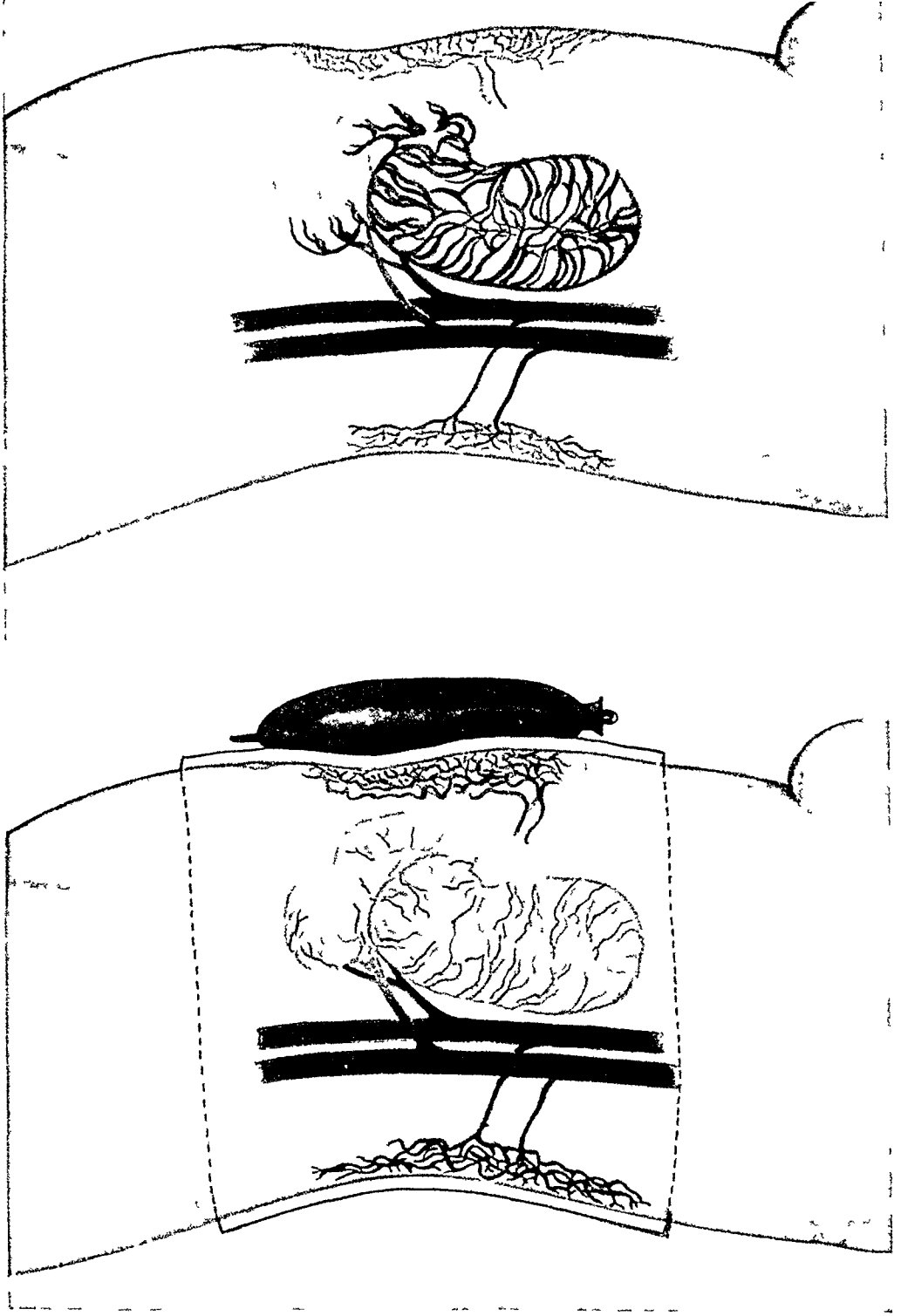


PLATE 70. Congestion, as illustrated in the upper figure, results in overcharging with blood the arteries and veins of stomach or other organs involved.
The application of hot pack or compress (shown in lower figure) to regions shown by dotted lines (hot-water bag depicted to indicate heat) draws away the blood engorging the congested organ to the surface of the skin. Hot applications may be continued until congestion is relieved.

plied to the head, the heating compress is of benefit in anemic conditions of the brain, with their accompanying headache, dizziness, or insomnia; also in acute head-colds. It is especially beneficial when applied to rheumatic joints at night or for an equivalent period of time during the day, following fomentations for half an hour or so.

Because of the probability of carelessness in applying this compress, it is necessary to stress the importance of having the moist cloths completely covered with the flannel in every case, whether there be one or several thicknesses of the latter. In the absence of this precaution the compress will have an effect opposite to that desired, through the production of congestion of the internal organs. When the compress is properly applied, it is capable of producing more satisfactory results than almost any other hydriatric applications. The unprotected heating compress may be used, but never the protected heating compress when, upon the patient's standing, there appear on the lower abdomen enlarged, varicose veins extending outward from above the pubes, or when enlarged veins appear on the upper abdomen just below the breast-bone.

The Heating Compress and Circulation



The "T"-bandage encircles the waist with a strip sewed or fastened to it at a right angle from its back and center in the same form as the letter "T." This strip is passed between the thighs and fastened to the front of the bandage. It should be long enough to encircle the waist and overlap several inches. This is thoroughly covered with a similar bandage of dry woolen flannel of three or four thicknesses, at least one inch wider.

The "T"-Bandage is a heating compress especially designed for use for pelvic conditions. It is made as follows: Old sheeting or linen cloth is folded into a bandage of three or four thicknesses, five inches wide, and long enough to encircle the waist and overlap several inches. A similar but shorter strip is prepared and sewed at right angles to the waist bandage, to fit at center of back, making a "T." This second strip should be long enough so that when the waist bandage is in place it may be pinned snugly to the front of the latter, after being drawn forward between the thighs. There should also be prepared a similar "T"-bandage of two to four thicknesses of flannel two inches or so wider than the first, so as completely to cover the latter when applied. The linen cloths are wrung from cold water and applied snugly by means of safety-pins; then the flannel bandage is applied dry, and is also pinned snugly in place. Usually no impervious material is used with this bandage, which may be applied at night and retained in place until morning, or until it is dry. Upon arising the covered parts should be quickly bathed with cold water, dried and frictioned to warmth. The sitz-bath upon removal of the bandage is an excellent procedure. This bandage should be thoroughly cleansed every day—as should all heating compress cloths.

The "T" Bandage

The "T"-bandage is serviceable in various abnormal pelvic conditions, though it should be avoided in cases of excessive menstruation or vaginal bleeding between menstrual periods. Ovarian tubal, uterine, or pelvic inflammation and pain, colon and bladder conditions, as well as inflammation of the prostate, seminal vesicles, and testicles, may be relieved by proper use of this bandage; also cases of incontinence of urine and with some benefit in urethral stricture. It may be applied at any time of the day or night, but should remain on for not less than one hour, and preferably for two or three hours.

Uses of "T" Bandage

Revulsive Compress.—This is an alternate hot and cold application, similar to the alternate compress; but it is named differently to distinguish the two, which differ only in the difference of time of application. While with the alternate hot and cold applications the duration of one temperature is approximately the same as that of the other, in the revulsive compress the hot applications remain on for four or five

Revulsive Compress

minutes while the cold, which immediately follow them, remain on for only fifteen to forty seconds. There is the same repetition of hot and cold as in the alternate compress, the cold always terminating the treatment.

The revulsive compress is employed chiefly in cases where the effects of heat are especially desirable (mainly in the reduction of pain), the short cold application serving to restore normal tone and absorb the extra heat. The application is serviceable in all conditions of pain, though it is true that there are some similar conditions in which cold applications are more agreeable to the patient. In all painful conditions of the digestive or abdominal organs, the revulsive compress is very beneficial, also in spinal pains and irritation.

Revulsive Compress, Uses of

The revulsive compress, or the alternate compress, may be applied to the spine with benefit in many cases, also to the head, particularly for congestive headache. In fact, there are so many conditions for which these two measures may be employed that they should be kept in mind by everyone likely to have charge of any case in the home or elsewhere. Mothers especially should understand how to use these applications. Instead of compresses, alternate sponging may be used, also alternate pouring, or the alternate use of hot-water bottles filled with very hot and with cold water.

Warm or Neutral Compress.—This is a compress with a temperature quite near that of the skin—from 92 to 97 degrees. It produces no reaction. The sensitivity of the skin nerves is somewhat reduced by it, while the organs beneath or in reflex relation to the region of the skin receiving the compress are quieted. The entire effect of this compress may be said to be soothing, though when applied to an arterial trunk there is some dilation of this artery, with increased flow of blood to the parts it supplies.

Warm or Neutral Compress, Uses of

Pains, spasms, hyperesthesia of the skin or internal structures, may be relieved by the neutral compress. After skin and wound inflammation have passed the acute stage neutral compresses may be used with benefit. Other conditions in which they are useful are neuralgia, chronic joint inflammations, joint sprains, painful conditions without inflammation, spinal irritation, insomnia (applied to the abdomen, some-

times to the spine), and numerous other conditions where it is desired to relieve skin irritations by externally applied measures.

Continuous Bath

CONTINUOUS BATH.—This is a full bath at about body temperature (neutral bath) continued as long as the case requires, whether this be hours or days or weeks. An ordinary bathtub is used, in a room well ventilated and provided with facilities for regularly changing the water (every twenty-four hours) and adjusting its temperature. But it is necessary that the patient be suspended in some sort of a hammock in the bathtub, for it is important that he be comfortable and not subjected to the continuous pressure upon the hard surface of the ordinary tub. Arrangements may be made for suspending the hammock over the tub so as to dip down into it, or it may be suspended directly in the tub by suitable means. However, an air mattress or blankets may be placed in the bathtub if necessary. Arrangements should be made to support the head, but the shoulders must be immersed if serious congestion of the lungs is to be avoided.

The water temperature should be between 94 and 97 degrees, great care being taken to keep it uniform. In some instances the patient may remain in it all day, going to bed at night. Except in case of inflammation or disease of the skin there should be gentle rubbing upon first entering the bath, but only for a couple of minutes. In the skin disorders for which this bath is beneficial, also in some other conditions,

Continuous Bath, Temperature of

such as bed-sores, severely contused or lacerated wounds and extensive burns, it is advisable to keep the patient in the bath both day and night, removing him for the purposes of defecation and urination only. When the patient is taken out for such purposes he should be rubbed moderately to dry the skin thoroughly, then protected with blankets until ready to return to the bath. The skin should be rubbed daily with vaseline to prevent undue action upon it by the water.

Occasionally it is advisable to lower the temperature of the continuous bath. This is true when a stimulation of the general vitality or of the heart is desired; also in fever cases. There is no harmful effect upon the vital organs from the continuous neutral bath; but when the temperature is lowered care must be taken to prevent too great depression. Various

forms of paralysis and nervous affections are decidedly benefited by the continuous bath. Among these are: Paralysis of one side of the body or of the lower extremities, locomotor ataxia, apoplexy, St. Vitus's dance, severe sciatica, dropsy, chronic rheumatism, hypersensitiveness of the skin and of the nervous system, eczema and psoriasis.

DISTILLED WATER.—See under *Drinking Water.*

DOUCHE BATH.—The douche bath is one given by means of one or more columns of water directed against some portion of the body. The douche is capable of being varied in temperature, force, or pressure, and in the amount of water used in the stream. In other words, it may be hot, tepid, cold, or any other desired temperature; it may be given with slight pressure or with a pressure of fifty or sixty pounds; and the amount of water may vary from the hair jet to a stream from a nozzle three-eighths of an inch in diameter. In the case of home equipment nozzles even larger than this are sometimes used. The douche may be general or localized, and by special appliances is capable of internal application, as to the nose, eye, ear, stomach, rectum, colon, bladder, urethra, and vagina. The douche is essentially stimulating, combining both thermal and percutient effects, and is one of the most powerful agents for good used in hydrotherapy—but also for harm if used over-energetically or at a wrong temperature.

Douche Bath

Through its combined thermic and massage effects the cold douche has a very powerful tonic influence. Not only does it stimulate the circulation of the blood, but it accelerates the flow of lymph. It increases the capacity for muscular and mental activity, especially when the applications are of short duration; it stimulates the appetite, together with digestion and assimilation, and tones up the nervous system to greater resistance against cold and other adverse conditions. The effect of the percussion itself is so pronounced that it may overshadow the temperature effect. Often, in fact, there is no thermic action and reaction, the effect being mechanical and mainly upon the circulation and nerves. By the rapid cooling of the skin, however, the douche favors pronounced thermic reaction also.

Douche Bath, a Powerful Tonic

The horizontal jet is the most common and serviceable form of the douche. Its simplest form of application is by means

The Horizontal Jet

of the jet nozzle attached to an ordinary piece of garden hose. It is important that the horizontal jet be broken into a spray when it is applied to inflamed or sensitive points, such as the abdomen, the heart area, and the neck, or to parts made sensitive by disease. A suitable way to break the jet into a spray is by extending the tip of a finger into it near the nozzle. In case of a robust person, particularly a man, the full jet may be given to the abdomen if the muscles of the part be voluntarily tensed. The jet is usually unbroken (except at times for the neurasthenic and the very sensitive) when applied to the back (except in the region of the kidneys), arms, legs and feet, or to the sides in the liver and spleen areas.

Horizontal Jet, Pressure Used in

To administer the horizontal douche properly there should be an ample supply of hot and cold water, so they may be mixed to any required temperature. There should be sufficient force to produce any pressure up to fifty pounds, and a hose or tube of sufficient capacity to give a considerable mass of water when desired. Naturally, the greatest pressure and the greatest mass of water will not be employed all the time, nor in every case. It is best that the head be thoroughly cooled before the douche is given, and often it is advisable to have a cold towel about the head or neck, or both.

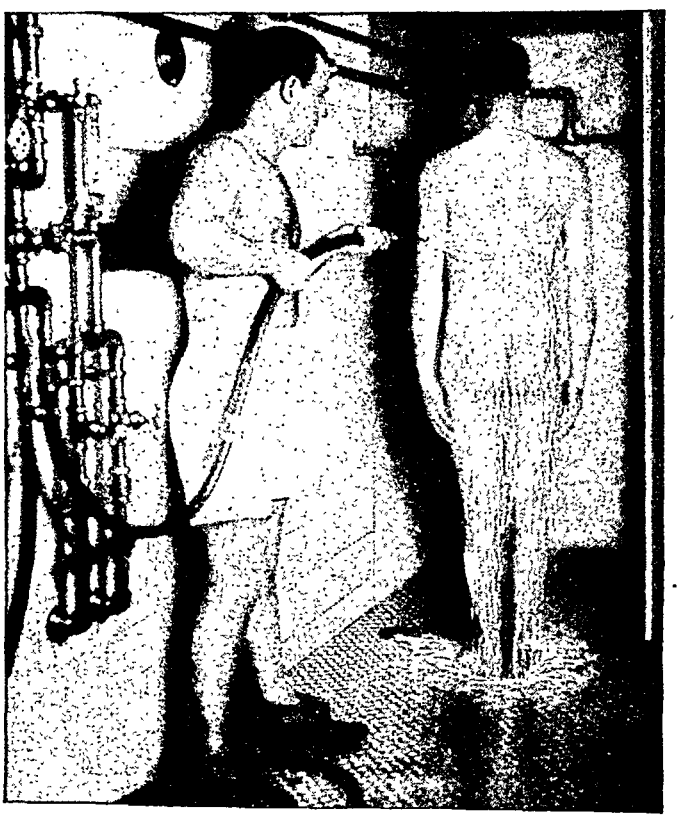


This picture shows the horizontal jet douche in action. Ordinarily, in a hydrotherapy treatment department, the operator is standing some 6 to 10 feet from the patient, who likewise usually is standing.

The patient stands at the required distance with his back turned to the douche appliance, the nozzle end of the tubing

being in the hands of the attendant. In beginning the douche the back is douched first, the stream of water travelling up and down and back and forth over the back, also up and down the arms which are held loosely at the sides. The region of the spine should receive special attention, the douche travelling from the coccyx to the base of the skull along the vertebrae and also on each side of the spinal column. The back of the legs down to the heels then receive attention, the jet travelling up and down one leg, then the other. To reach the back the douche may start at one heel and travel up one leg to the hip, then down, then up the other leg to the hip, then douche the back in the manner described above, completing this latter operation before the legs are again douched. The patient now turns one side to the attendant, holding the near arm out so that the douche may reach the side of the chest, including the armpit, then lowering it and receiving the jet on the arm itself. The other side is treated in the same way. The patient then faces the attendant, and the front of the legs and body are treated as were the rear parts, care being taken to break the jet at any point required. In taking the douche in this position, it is advisable for a man to stand with his hands covering the genitals, in order to protect

Manner of Using Horizontal Jet

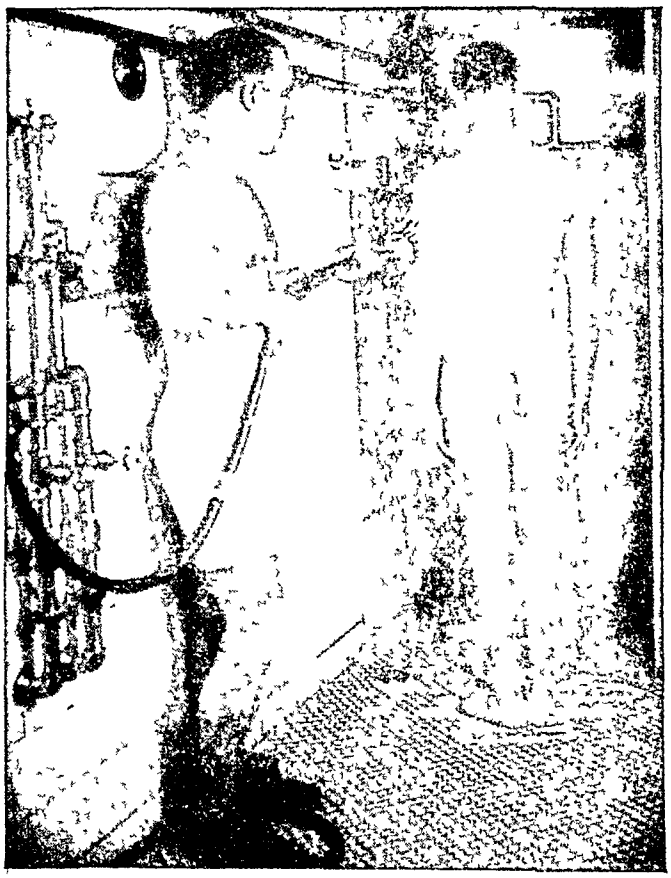


When giving a horizontal jet (with direct stream), the operator holds the nozzle in both hands for greater precision.

them in case the jet is not perfectly controlled. The treatment ends with a strong douche to the feet, except that occasionally the patient turns around once or twice while the rapidly raised and lowered hose plays a fine spray over the entire body. No side of the body should receive the jet for more than a few seconds at a time, but the entire body may be gone over several times. It is important to bear in mind that the stream is not allowed to fall steadily upon one spot (except when the localized douche is given), but must be applied with steady, unhurried motion to the several regions of the body successively, and no time should be lost by the patient in turning from one side to the other.

Temperature of Horizontal Jet

Ordinarily the temperature of the douche is reduced after the initial application to meet the special condition of the patient; but the best effects of this form of treatment are obtained by immediately following an initial hot douche with the cold douche. This should be done when there are no contraindications to giving the fully cold douche. However, there must be no intermission between the hot and the cold douche for the radiation of heat during even a very few seconds' interval between the two temperatures will reduce the reaction to the cold douche. If there is any delay, the



A soothing douche for a nervous case given with a horizontal jet spray. This method of spraying is very effective over inflamed and sensitive areas of the body.

With the proper appliances the douche is capable of a variety of applications. The neutral douche at low pressure is calming and sedative, when taken for from three to fifteen minutes. Yet the same douche used with a pressure of from fifty to sixty pounds dilates the surface vessels and causes contraction of the vessels of the brain and internal viscera, thus powerfully stimulating instead of soothing. But the neutral douche has so decided an effect in *lessening the muscular tone* and capacity for work or activity that it should never be used when the patient is strong enough to endure the hot and cold or the cold douche.

There are so many contraindications to the use of the douche, especially the cold douche and the high-pressure douche at any temperature, that generally it is better that both the temperature and force, and also the length of treatment, be prescribed by an expert. It is a great power for harm, as well as for good. Still, if one uses reason in making the application, especially to one who is fairly vigorous, the douche may be given safely and with benefit.

Home Douche, Equipment for

Many people may want to know how a body douche can be taken in the ordinary home. With canvas so arranged as to restrict the splashing water and direct it to a suitable drain, one may attach to the bathtub faucet, or other suitable source of water supply, a hose such as is used for the portable hand spray, if a larger hose cannot be fitted. Another appliance that may be used with good results is a spraying pump such as is employed for spraying vegetation. Where there is a hose attachment for spraying the lawn, or one in the garage for use about the car, cold douches may be given very conveniently by using a nozzled or plain piece of garden hose. Extreme care must be taken, however, not to overexpose the body to the cold douche, or to prolong it too much, or use too great force, or delay drying, dressing, and exercising.

The horizontal rain douche is better for use in the home by those untrained in hydrotherapy. For this, the best appliance for home use, where expensive equipment cannot be secured, is the portable hand spray mentioned above. This consists of a length of tubing one end of which is fastened to the bathtub faucet, and to the other end is attached a head that is perforated with a number of holes, much like the head

Horizontal Rain Douche: Its Uses

of a sprinkling can. The head is usually about three inches in diameter. This spray is employed in the same manner as the horizontal jet.

The effects secured by this spray are the same as those of the ordinary douche except that they are not so pronounced owing to the fact that there are several small streams instead of a single large one, and that these, while covering a larger area have less force. It resembles the broken or fan spray from the douche apparatus. In all cases where stimulation to the circulatory reaction is indicated but where the horizontal jet would be too severe, also in other conditions where the specific effects of the horizontal jet are desirable but where this severe application cannot be given, the spray douche will prove beneficial as well as safe and enjoyable. One advantage of this spray over the horizontal jet is that it may be used very readily on all parts of the body. By giving the spray with the high pressure but with the spray nozzle some distance from the skin, also by using cold, or hot and cold water, great stimulation may be produced though its very form prevents it having as great stimulating value as the horizontal jet.

The Spray Douche

The spray has so many uses that it is impossible to enumerate them here. It may be used for local effect or mild general effect, it may be given at any temperature, and with considerable variation in pressure or force. There are so few contraindications to its use, and these so unimportant, that it may be said to be valuable in practically any case, though always in heart, lung and kidney diseases care must be taken to avoid overstimulation or depression.

The percussion douche is practically the same as the ordinary douche or horizontal jet, except that by means of an ingenious device the stream of water is cut off at rapid intervals and air under pressure introduced so as to increase the force of the propulsion of the water upon the body. The result is a fusillade of water jets which strike the body one after another with considerable rapidity. As with other douches and water applications, the percussion douche can be used at any temperature and at various pressures, and it is especially desirable where rapid and powerful reactive effects are required. The skin can endure both hotter and colder water when applied in this way than when a steady stream is used. It allows

Percussion Douche, Application of

the use of very hot water on the bodies of those (especially neurasthenics) who are sensitive to cold and shrink from the ordinary cold douche. In these cases the hot application at first is not followed by cold, though after a time it is followed by progressively lower temperatures. This kind of douche applied to the skin is the most powerful of all known tonics, but considerable care is necessary in selecting the cases for its use.

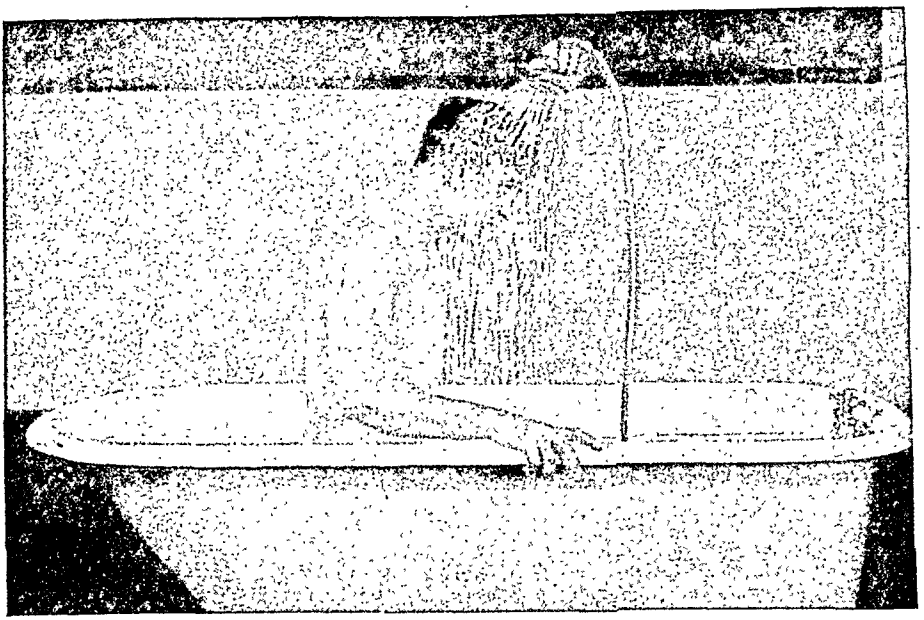
In general treatments it is often advisable to give less powerful douches or other water applications to the major portion of the body and the percussion douche to the back and legs only. By using water at neutral temperature one can, through the mechanical effect of this douche (as in the case of the horizontal jet), secure marked circulatory reaction without any thermic reaction whatever. Such an application is especially beneficial in excessive sensitivity of the spinal nerves and the numerous abnormal sensations and reflex pains resulting from it.

The Rain Douche.—See *Shower Bath or Rain Douche.*

DOUCHES.—*Localized Douches.*—There are times when it is desired to produce a special effect upon some particular part of the body, internally, as a rule, but also externally at times. The douche at the indicated temperature localized to the skin area in connection with the internal part, or to the skin of the external area requiring treatment, is a most excellent means of securing many of these effects. Thus there are douches specifically used to affect the brain, the brain and spinal cord and nerves, the lungs, the heart, the stomach, the liver, the spleen, the kidneys, the reproductive organs, the joints and muscles. The areas usually treated locally by the douche are the head, upper back, lower back, chest, shoulder, breastbone (sternum), upper, lower or entire abdomen, feet, soles, and anal and perineal region.

The Localized Douche

By means of the *douche to the head* the central nervous system may be very powerfully influenced. However, much care must be observed in giving any douche or pour to the head. The affusion or pouring bath to the head, or the thoroughly wet hair, the thin wet compress that permits evaporation (evaporating compress), or the ice compress, is usually better than the head douche, because more easy of application and less likely to be continued to the point of depression.



The head douche may be given in many ways, its use being largely determined by the ailment. The above method is one of the most common and effective, the portable hand spray being employed.

Method of using Head Douches

In giving the head douche the patient may lie upon the abdomen with the head extending over the end of a couch so that the water may be poured upon the back of the head from a height of from a few inches to two or three feet; or he may sit in a sitz or ordinary bathtub in hot water while the water is poured on the top of the head and allowed to run down over the front and back of head.

Short cold head-applications cause the cerebral blood vessels to dilate. Thus in cases of typhoid or other grave fever in which it is necessary to arouse the activity of the brain, and thus excite the nervous and muscular systems throughout the body, it is well to pour water at from 50 to 60 degrees gently over the back of the head. Such an application given for a short time will stimulate the brain; but, if continued too long, the effect will be very depressing. This application is also useful in melancholia, either with or without stupor, in cerebral anemia, and in heat prostration where the skin is pallid.

The cold douche to the back of the head or neck will often allay cerebral excitement and may be useful in insomnia or any form of cerebral irritation. Such an application should

continue only for three to five minutes, and the pour will be better than the douche. A general neutral douche often aids in promoting sleep in cases of insomnia, but its effect will be much more pronounced if used in connection with the neutral fan douche directed to the back of the head and neck of the patient.

Head Douche, Application of

Hot douches or pours to the head are not used a great deal, for considerable caution is necessary in their application. However, in collapse and fainting and in migraine or sick headache, without high blood pressure, the hot pour, as described under *Affusion or Pouring Bath,* may be used.



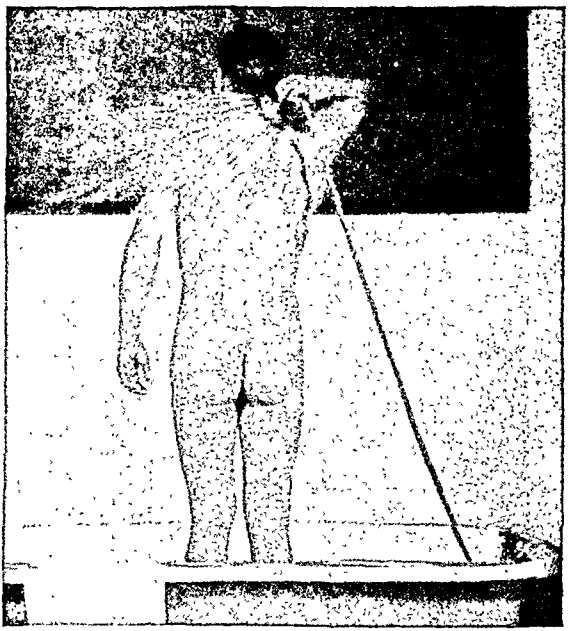
The Spinal Douche

Illustrating an easy position for a patient getting a spinal douche with a horizontal jet. The water is applied not only up and down the spine several times, but along each side of it for a distance of from three to four inches.

It should always be borne in mind that milder measures should usually be employed first when the head and neck are involved, the effects of these being carefully observed before more vigorous measures are used. The latter will usually not be necessary if the milder measures are properly employed, in conjunction with other forms of treatment. Regardless of the abnormal condition being treated and of the hydriatric measure being employed, one should not rely solely upon the application of water for correction.

The spinal percussion douche is often employed in different forms and at all temperatures with excellent results. The jet should play not only upon the center of the

spine but also over a distance of three or four inches to either side, and usually with all the pressure the patient can endure, unless percutient effects are not desirable. The percussion douche is the favorite application, but of great value also are the horizontal jet, either full or broken, the fan douche and the spray.



Ordinary bath spray employed as a spinal douche. The lower half of the spine can be treated by assuming the position shown for the lumbar douche.

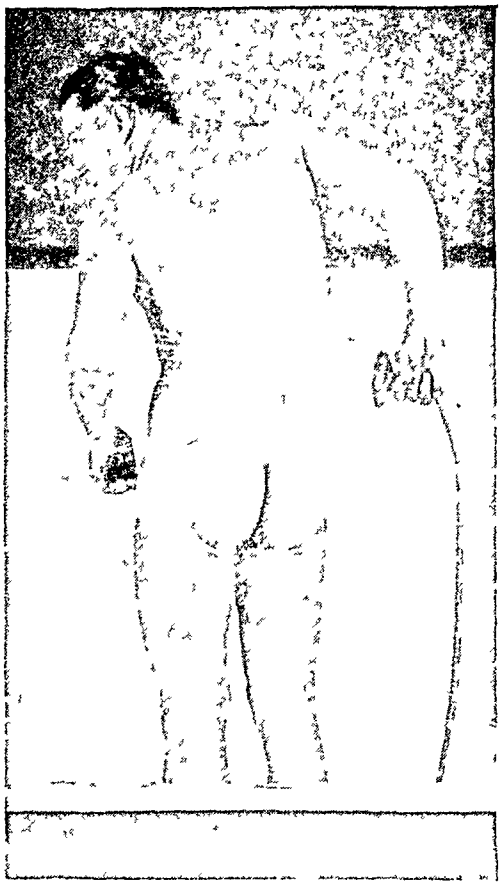
The cold spinal douche, whether employed as here described or in whatever simple fashion is possible in the bathroom, out-of-doors or elsewhere, is an excellent invigorator. A single application will often make firm converts to this treatment. It is followed by a sense of buoyancy, with marked increase of energy, and, when it is used daily, even chronic neurasthenics may often be restored to normal nerve balance within a comparatively short time, especially if other health measures are also given a certain degree of attention.

Such applications are also of much benefit in cases of melancholia. But they should be strictly avoided in all cases of destructive changes in the spinal cord, vertebrae, or brain. In some of these cases the warm spinal douche at moderate pressure will be serviceable.

The Alternate Hot and Cold Douche

The alternate hot and cold spinal douche is excellent for use by those in moderate health who wish to increase their general vigor, as it is also for those in vigorous health who wish to retain their vigor, or merely to enjoy the stimulation resulting from this treatment. It is also beneficial in such abnormal conditions, as lumbago and diabetes insipidus (non-sugar diabetes).

Lumbar-Douche, Various Uses of the



The lumbar douche, as here shown, usually is applied cold, with considerable pressure and for short periods. The alternate hot and cold lumbar douche also is used very effectively. When given in a hydrotherapy department the percussion hose usually is employed.

The *lumbar douche* is an excellent application for numerous abnormal conditions of the pelvic organs and those of the lower abdomen, and of the lower extremities. The lumbar douche applied cold, with considerable pressure and for short periods, is particularly helpful in constipation, amenorrhea, infantile uterus, retarded development of the pelvic organs or functions, and bladder weakness without pain. The alternate hot and cold lumbar douche produces very excellent results in neuralgia of the ovaries and uterus, lumbago, and congestion of the kidneys. When used in connection with corrective exercises and, perhaps, in some cases, with an abdominal supporter, it is of marked service in relieving the backache due to uterine displacements.

The use of these special douches requires an intimate knowledge of the cutaneous areas and reflex areas governing or influencing the various organs, and therefore they should usually be prescribed by an expert in hydrotherapy. In good health or even in moderate or only fair health some degree of experimentation may be permissible; but in illness involving some vital or important organ or structure this is not permissible. The cold douche is used locally to the perineum in chronic prostatitis, as a general measure in sleeping sickness, and as a spinal application in some brain conditions. As a local vaginal douche it often is used in cases of hemorrhage from the uterus. The hot vaginal douche is used in all uterine, ovarian and Fallopian tube inflammations, and the very hot

vaginal douche is efficacious in checking bleeding from the uterus. Warm douching of the external auditory canal is recommended in acute and chronic otitis.

DRINKING WATER.—When we recall that water forms sixty-five per cent. of the adult human body, and sixty-six and one-half per cent. of the body of the growing child, we can appreciate the importance of maintaining proper proportion of this element in the body. This is absolutely necessary for the health and well-being of everyone. It may surprise many readers to know that in what we term the solid parts of the body there is considerable water. Thus even in the teeth there is ten per cent. of water; in the bones thirteen per cent.; in ligaments almost seventy-seven per cent.; in the muscles seventy-five per cent.; in the brain seventy-five per cent. In the fluids of the body—the bile, pancreatic and gastric juices, blood, lymph, saliva—water averages over ninety per cent. of the total, but the organs of a fully nourished man contain slightly less than those of a poorly fed person. Life is possible only in a liquid medium, and every cell in the body alive and serving its function is submerged in water. Normally an adult takes in daily from about four to six and one-half pounds of water when on an average diet. But variations of diet, exercise, labor, temperature, etc., may and often do greatly modify the amount.

Percentage of Water in Tissues

We lose considerable water regularly through the skin (perspiration), lungs (vapor), kidneys (urine), and bowels (feces). Many people do not consider that there is a loss of water by breathing, but twenty per cent. (one-fifth) of the total fluid lost by the four channels enumerated passes off in the form of vapor from the lungs.

In all the fluids of the body water is the general solvent. By means of it alone circulation of nourishing material is possible. All food elements, whether liquid or solid, are dissolved in this medium before absorption. By means of water all waste products, except gaseous, are removed—and also even small amounts of gases. Every process of secretion, of exchange of fluids with their solids between different regions through membranes, and of nutrition, depends necessarily upon the presence of water.

Importance of Water in Body

Some water is manufactured in the body, by the chemical

union of hydrogen with oxygen in the various oxidations that take place therein. For example, medical scientists have proved that from every ten ounces or ten pounds of fat in our bodies that is oxidized, or burned up into energy, the resulting product is *energy* (or heat), carbon dioxide (gas) and *eleven* ounces or eleven pounds of *water*.

Reserve Water Supply

The hump of fat on the back of the camel is really his reserve water supply. As he consumes energy on his trip across the desert, for every ten ounces of fat that he burns up, his body has produced for his immediate needs, *eleven* ounces of water or ten per cent. more water than the fat he originally had. But by far the greater part of the water in the body is taken into it as water, in drink and in food. As in the body itself, even the more solid structures, consist largely of water, so every article of food we consume, regardless of its nature, carries more or less water with it.

Any great alteration in the water content of the body is accompanied by unfortunate results. Thus in diarrhea, dysentery, cholera, etc., water is lost in such large quantities as to make the blood thick and to reduce the fluidity of all body fluids, thus altering all functions. If such loss be long continued the vitality is bound to suffer, and death will eventually result. Some tissues of the body, especially fat, give up their water much more readily than others, the water in the non-fatty tissues being more closely united with the cellular organic matter. But eventually the water will be drawn from these tissues to some extent, to replace that lost by the less dense tissues, if the loss is not replaced in the normal manner.

Danger of Loss of Reserve Water

From the foregoing it is evident that water is a very important and necessary constituent of the body. Yet it undergoes no chemical change in the body, neither is it a definite source of energy. It does, however, make possible other chemical changes absolutely necessary to the maintenance of life and health.

When we drink water we give ourselves one form of internal bath. The water is absorbed chiefly from the small intestines, and after absorption serves to dilute the blood and other body fluids in which the cells are bathed. This normal dilution of the fluids helps to purify and maintain the body's standard of chemical purity. The circulation of the blood is

accelerated by the free use of water, and this stream thus becomes more truly the stream of life. The flow of lymph also is accelerated. The proportion of water in the blood-serum is increased about six per cent. or even more by copious water drinking. While this dilution increase lasts, the blood-serum and the blood itself are made more efficient absorbents of harmful elements deposited here and there and are enabled to carry to the eliminating organs much larger quantities of chemical waste products.

Effects of Water Drinking

But the constituents of the blood also are improved in nature by plentiful water drinking. The tendency of this fluid is always to maintain a certain specific gravity, and, as it circulates more freely through the blood-making organs when diluted, it aids in their functions. Thus all the bodily cells are supplied and cleansed.

Blood is composed of six groups of chemicals: 1, water; 2, sugar; 3, salts; 4, gas; 5, cells; 6, ashes or sewage.

The thinning of the blood-serum through the free drinking of water greatly increases the activity of the kidneys, skin, and bowels. Many people think that when the quantity of urine is increased by water drinking there is merely an additional amount of water discharged. But there is also an increase in solids, particularly urea, salts, and other waste ashes, all very good waste products to get rid of. By means of water, food materials are carried to the tissues. Even moderate water drinking influences the assimilation of food and also the tearing down of useless cells, thus having a great influence upon metabolism.

When ample quantities of water are taken into the body the heart often becomes steadier in action, gland function is increased, and in fact all forms of activity within the body are enhanced. Not only is the activity of the excreting or eliminating glands increased, but also that of the secreting glands. Thus, metabolic processes are favored. End-products of digestion that are not available for use by the body, together with the products of imperfect oxidation, are greatly reduced in amount, even are prevented from forming and are better eliminated, because of adequate water drinking. The health of the individual, therefore, becomes much more stable, for the entire body is more functionally alive. Copious water

Water and the Blood

drinking slightly raises the blood pressure; but in most cases even of high blood pressure there will be nothing but benefit from this increase, for the duration will be short and some of the causes of the abnormally high blood pressure will be eliminated. See *Blood Pressure,* Vol. VII, page 2836.

There are numerous therapeutic applications of water drinking, but, as they will be given in connection with the various diseases concerned when these are considered in the two following volumes it is not necessary to give them here.

In the majority of people in health and ill health, fair quantities of water should be taken daily. Too many people (in fact, hundreds of thousands) fail to drink enough to maintain proper dilution of their body fluids. These persons might advantageously drink a glass of water every hour while awake, at least for several days, after which they may reduce the quantity imbibed to that slightly above the amount needed to maintain the greatest degree of health, which is from six to ten glasses a day, will be taken. In many cases four or five glasses daily will be sufficient. This is especially true if one's diet contains an abundance of juicy fruits and green vegetables; and of course the use of milk and soups will further reduce the need for water. One should bear in mind, however, that milk is only partly water—that it may be considered a solid food since thirteen per cent. of it is solid material. For this reason milk cannot be used entirely in place of water. So it is urged that unless one is on the strict milk diet, some water should be taken every day, and it will be beneficial to many people even when on such a diet to use at least one glass of ordinary cold water upon arising in the morning. It should be remembered that there is an occasional case in which the stomach should have complete rest, and then it is advantageous to discontinue eating and all drinking of water for a time, the needs of the body for water being supplied by enemas.

Water and Food Assimilation

Water and Various Disorders

Some of the abnormal conditions of health in which the copious drinking of cold water will be beneficial are failures of nutrition, with wastings and the various tendencies to disease (diatheses): gouty, rheumatic, scrofulous or strumous, uric-acid, etc. In dropsy, thinness, obesity, diabetes, fevers, "dead" skin conditions, bowel sluggishness, chronic toxemia and that variety of the latter condition sometimes called

chronic biliousness, hardening of the liver, gall stones and other disturbances of the gall bladder, and numerous other abnormal states the free drinking of water should be encouraged; in fact, in most of these conditions it is a necessity and should become a habit.

Cold-water Drinking.—The temperature of the water usually should be that of the cold-water hydrant. Sometimes this becomes too cold, but ordinarily it will be at from sixty to seventy degrees, which range of temperatures is best. Ten degrees colder (fifty degrees) will not be harmful in most cases. Very cold water should be sipped, or, in most cases, avoided, though it is beneficial in cases of constipation, fevers, and abnormally low gastric acidity. Ice-water, however, should never be drunk, though ice may be used to make drinking water somewhat colder than it naturally would be, especially in some localities and in summer.

Cold-water Drinking

The quantity of water drunk will vary somewhat. It may be stated that except during meals one may safely drink water at any time when there is desire for it. If one has no thirst it may be because considerable quantities of liquid are taken otherwise, or it may be from habit. In the latter case water should be drunk more or less regularly, say every hour, until the drinking becomes a habit. For constipation, an excellent natural stimulant and tonic is two glasses of cold water upon arising and the same amount upon retiring, and in addition a glass at a time four or five times during the day. During fevers a glass of normally cold water or even water made colder with ice (not ice-water) may be taken to advantage, every hour, or whenever the fever rises above two or three degrees. When there is insufficient gastric acidity, half a glassful of cold water thirty minutes before each meal will aid digestion by increasing the secretion of gastric juice when the reaction sets in.

Hot-water drinking can easily be overdone, and in fact often is. There are occasions when the drinking of hot water will be beneficial, but, as with all other hot applications, hot water taken into the digestive tube lowers function except immediately after being taken. Cold water has the opposite effect. The primary effect of hot water is stimulation, whether applied to the skin or to the mucous membranes; but there is

Hot-water Drinking, Effect of

the following reaction, which always takes place and is atonic. This may last for a considerable time—much longer than the primary effect. All functioning of the stomach is greatly reduced during this reactive stage, and sometimes it is entirely suspended. Hydrochloric acid, the powerful protein digestant of the gastric juice, is secreted in much less amounts after hot-water drinking. From this we find that when there is an excess of this acid (hyperacidity) or excessive secretion of gastric juice (gastrorrhea), the drinking of hot water will be beneficial, providing it is taken *hot* and drunk rather rapidly. But in case of hypoacidity cold water should be drunk, several ounces half an hour or so before meals. In painful conditions of the stomach not associated with definite structural changes, hot-water drinking is helpful. Vomiting is often relieved by the slow sipping of very hot water, though usually it is not advisable to suddenly check this process. It is a safety procedure in many cases. Chronic gastritis is greatly helped by this drink. So also is gastric colic from indigestion.

Distilled Water.—Chemically pure water does not occur in Nature, for water always absorbs minerals. It is impossible to free it of these elements except by distillation, but proper filtering will take out some of them and boiling will reduce others. The drinking of distilled water is often beneficial, but its regular use by everyone is not advisable, for unless the mineral elements needed by the body are plentifully supplied in the food there may be absorption of some of these elements from the body cells. In most cases, however, there is not a great deal of danger of harm from this source; for even with an average diet it is probable that the "salts" absorbed by the water will not be sufficient to cause a shortage; and at the same time the greater absorption from the tissues of toxic material and deposits by blood receiving only distilled water will be a benefit to health. But in the average case, if distilled water is used it should first be aerated.

Filtering—Boiling—Distilling

Many people consider mineral water of no special value; many consider it to be harmful; and many more consider it to be very beneficial. As a matter of scientific fact each one of the three groups of people is right, for it all depends upon the chemical content of the particular mineral water. Most of them are of value only because they encourage water-

Mineral Water

drinking. However, as a result of scientific advances in the chemical studies of the human blood, it is now known that, when individuals suffer from acidosis (which is a general toxic condition) the bones, the teeth and other tissues are being robbed of mineral salts. There are approximately 10 ounces of table salt or sodium chloride in a normal individual's body. There are one fifth of an ounce of calcium carbonate; about nine one-hundredth of an ounce of inorganic phosphorus; about five ounces of potassium and minute amounts of magnesium, iron, and other inorganic minerals.

Purifying Contaminated Drinking Water

While the mineral content of water is often injurious, a much greater menace to health is its *contamination* by surface drainage, sewage, industrial plants, and by fish and other inhabitants of the water. Unless the supply is known to be uncontaminated, drinking water should be boiled or filtered or both. These are good precautions to take at any time, especially the boiling. Chlorine is often used in water to remove some of the forms of contamination. This substance is widely used for clearing the drinking water of municipalities of microbic organisms, but some claim that it does not destroy the organisms, merely reducing their activity. The taste of the water is somewhat altered by this treatment, and to many people becomes so disagreeable that far less than the proper amount is drunk. Chlorinated water, however, has been in common use in the United States Army for years when circumstances required it. The amount of chlorine liberated in the water is very little, and while it does not give it too pleasant a taste, it has certainly proved its value as a bactericide. It has been suggested that the appearance of goitre in some districts may be due, in part at least, to the use of chlorine, which is said to reduce the amount of iodine imparted to the water by the vegetation.

Chlorinated Water

Drinking Water, Filtration of

The filtration of drinking water through beds of sand is also a method used quite extensively by municipalities both here and abroad. The water passes through the filtration substance before entering the water mains. Chlorinating plants are also installed at many public reservoirs.

Swiftly running water, when shallow and when passing over a rough stony bottom, is said to be more or less freed of bacterial content.

Ozonated Water

A few years ago a method of purifying drinking water by ozone in the form of ozonated air had numerous supporters. This method seemed to have excellent possibilities, for ozone is a powerful destroyer of organisms. But the method failed to materialize as a universal solution to the problem of water purification, possibly on account of the expense of operation on a sufficiently large scale. Another system capable of producing excellent results but also limited because of its expense, is the exposure of the water in thin layers to ultra-violet rays, which, as we know, have a powerful bactericidal action. This method necessitates a suitable lamp (mercury-vapor or carbon-arc) and means whereby the water may be passed before the rays of the lamp in thin layers, for the penetrating powers of the rays are limited. Both methods also require reduction of the turbidity of the water for best results, which means that some form of filter must be used beforehand.

Drinking Water, Value of Boiling

Boiling of drinking water, then, becomes the best method of purification for home use, though this method seldom is employed. Those who have their own wells and cisterns hope to purify their contents by merely dropping some chemical into the water, and the water of some of these wells and cisterns is badly contaminated.

Hard Water

Hard water (which contains much mineral matter in solution, especially lime) should be boiled for a considerable time to reduce the excess of lime that it contains. However, there are some hard waters that cannot be softened by this process. The most thorough boiling will not remove all traces of lime. *Water that contains considerable mineral matter is absorbed* by the body slowly. Slight acidulation of the water will encourage its absorption. Thus lemon juice may be used in small amounts in drinking water for this purpose. As this is beneficial in other ways, and as many people will not drink sufficient water because of a "distaste" for it in its unaltered state, it is a good practice to use at least a few drops of this acid fruit juice in each glass, unless there is some contraindication to the use of fruit acid. Carbonated distilled waters are soft and easily absorbed, and these and unsweetened fruit juices are excellent drinks for regular use by most people. If fruit juices are taken regularly it is important that they should be well diluted.

Carbonated Water

Several paragraphs back it was intimated that there are cases in which drinking water should be avoided. The chief condition in which *all* water should be withheld for a time is pronounced dilatation or prolapse of the stomach, for the organ cannot readily discharge its contents into the intestines, and hence there may be aggravation of the abnormal structural condition. The other contraindications to drinking water concern chiefly extremely cold water. Cold-water drinking is contraindicated in cases of colic, during fatigue or exhaustion, especially when there is marked sweating, and by those who are feeble, except when they are engaging or about to engage in some light activity. Farmers and others who have had experience with horses will not allow them to drink heartily of cold water when they are panting from labor or sweating profusely. They permit the horses to take only a few swallows at a time until they have had sufficient.

When Not to Drink Water

Sipping water at any temperature, at least in small amounts, will have an effect quite different from that of drinking it rapidly at the same temperature. Even during meals cold water, which should not be drunk rapidly in any case at any time, may be taken, often with benefit, if slowly sipped.

Dripping Sheet.—The dripping sheet is much the same as the *Wet-Sheet Rub* (which see for method of application), except that it is a much more vigorous thermic application. The sheet, as the name implies, is dripping with water, and instead of the patient being rubbed after the application, as is done in the wet-sheet rub, the body is vigorously spatted or slapped while covered with the sheet. This spatting is continued for not more than half a minute, at the end of which time a half pail of water at a temperature fully five degrees lower than that used for the sheet is poured over each shoulder. The spatting is then resumed for another half-minute; then, if a very vigorous application is desired, another pail of water at a still lower temperature is used as before, and the slapping resumed.

Dripping Sheet, Its Application

The temperature of the water used first to wet the sheet is usually about 80 degrees; that of the first pail is about 75 degrees; and that of the second pail about 60 degrees. These two pails should be in readiness, filled with the water at the

temperatures mentioned. In giving the spatting the sheet is not disturbed, the treatment being given over it and to it as if it were part of the body. Two attendants are preferable, for the spatting should be vigorous and should go over the entire body several times as rapidly as possible.

If, after the first shock, the patient begins to have a secondary chill, the bath must be terminated at once; and, in an occasional case, some heating measure may be necessary. However, the spatting, when effectively done, will insure reaction in most cases.

When it is impossible or inadvisable for the patient to stand up for this treatment, the application may be given in bed, with a rubber sheet to protect the bed-clothing. The wet sheet in this case is partially wrung, then applied quickly as with the wet-sheet pack. Instead of pouring the water over the sheet as advised above (for the treatment when standing), a little water may be sprinkled with a sponge or splashed with the hand. Such vigorous slapping as advised for the ordinary case (with the patient standing) cannot be endured by most patients who must take the application in bed, but the two attendants should encourage reaction between each two water applications by moderate rubbing and slapping over the entire surface. After the treatment is completed the wet sheet is removed, the patient is wrapped in a Turkish or dry linen sheet and then covered with a woolen blanket. When or if after fifteen minutes the temperature per rectum reaches 102 degrees or higher the dripping sheet is again applied.

The hot dripping sheet, if applied very hot and very quickly, is beneficial in cases of fever and feeble heart action combined, as a preparatory treatment for the cold wet-hand or cold-towel friction.

Dripping Sheet, Uses of

The chief use of the dripping sheet is in fever cases where the cold bath is inadvisable. Thus in typhoid fever it may be used, with much greater convenience than the Brand bath. But it is equally good in other continuous fevers. And because of the ease with which its intensity can be modified, and the pronounced thermic and mechanical effects produced by it, it may be used in place of most other hydriatric procedures. It may also be used with excellent effect after any sweating bath or procedure, such as the cabinet bath, blanket pack, etc. Its

convenience makes it a valuable home application. The greatest tonic effects are secured when the water used is quite cold (about 60 degrees).

There are so many conditions in which this application is of service that no attempt can be made to enumerate them all. But it may be said that it may be used with very great benefit in practically all chronic conditions of the digestive and other abdominal organs and also of the lungs and bronchial tubes, as well as in general conditions such as rheumatism, gout, neurasthenia, obesity, diabetes and malaria; also in insomnia due to cerebral congestion, and in valvular heart disease and dropsy resulting from heart disease when the patient is fairly vigorous. The conditions in which it should *not* be used are cases of skin eruptions and skin disease, excessive sensitiveness of the skin, acute inflammation of the internal organs and generalized neuritis and neuralgia.

DRY ABDOMINAL BANDAGE.—See *Abdominal Bandage, Dry.*

DRY FRICTION BATHS.—See *Friction Baths, Dry.*

DRY HEAT.—Sometimes dry heat is much more beneficial than moist heat, and sometimes it is better to give dry heat and moist heat alternately. Dry heat is not a hydrotherapeutic procedure.

DRY PACK.—This also is a non-hydriatric application, but because it is employed in the same manner as the hot-blanket pack, also because it is not a procedure such as is thought of when dry heat is referred to, it is included in this section. It is not widely used, as there are other measures, particularly the hot-blanket pack, that are more convenient and more suitable in most cases. For patients in collapse or shock, or who are weak or anemic through loss of blood, as from hemorrhage or surgical operation, or in the stage of intermittent fever, or in other cases in which the temperature is subnormal, the dry pack serves the purpose of raising the temperature by lessening the heat elimination. Sometimes it is very beneficial when used in conjunction with such external heating agents as hot-water bottles or hot sand-bags.

The Dry Pack, Its Uses

The pack is applied in the same manner as the hot-blanket pack, except that dry woolen blankets are used, care being taken that the blankets are well tucked about the neck and

feet to prevent a circulation of air under them. When the patient is feeble or cold or unable to generate his own heat, hot-water bottles or hot sand-bags should be placed at the sides and feet just outside the first blanket. One or two glasses of normally cold water should be drunk immediately before entering the pack and every fifteen or twenty minutes while in it. When it is necessary that perspiration be established, the pack may continue as long as necessary, even up to four or five hours. But, if it is desired merely to increase the body heat, the patient should be removed from the pack before perspiration starts. This measure is of great value in cancer, convulsions, cough without fever, croup (to neck and body), emphysema (to chest and abdomen), gallstones (to abdomen), gangrene, gout, herpes (at night), hydropericardium, incontinence of urine (to pelvis), dropsy of kidney, stone in kidney, to hips for dysmennorrhea, and non-pregnant suppression of menstruation; neuritis, orchitis, peritonitis; to the throat in pharyngitis; bubonic plague; to the chest in pleurisy; pneumonia, relapsing fever, rheumatism, scarlet fever, sciatica, skin diseases, spasm of muscles, toxemia, and locally in stricture of urethra with pain.

Dry Pack, Its Application

It is necessary to be cautious in the use of this pack, as heat elimination is greatly reduced. Therefore, if the dry pack be continued too long, the temperature may be raised in some cases higher than is beneficial to the patient, especially when applied in the cold stage of malaria to prevent the chill. Except in cases of obesity, the dry pack should not be used to produce perspiration more often than once or twice a week, and even in obesity it should not be used more often than this if the patient is deficient in vitality. Extremely excitable and nervous people and children do not take the dry pack well. It should not be used in skin disorders associated with eruptions, or in cases of nervous heart. See *Wet-Sheet Pack.*

Precautions in Applying Dry Pack

Effervescent Bath.—See *Nauheim Bath.*

Electric Light Bath.—See page 2518, also *Static Insulation* or the *Static Bath,* Section 6, in this volume.

Emollient Baths

Emollient Bath.—This is a bath identical with the full or immersion bath, except that some skin-soothing substance (an emollient) is added to the bath water. One of several substances may be used, the quantity mentioned below being

for about thirty gallons of water. A paste made of one pound of either corn-starch or isinglass to a gallon or two of water may be added to the bath. Or four to six pounds of bran or oatmeal may be soaked for fifteen or twenty minutes in enough water to cover, then added to the bath. The first two substances are the better. The temperature of the bath water should be about 95 degrees. Some forms of irritation and inflammation of the skin are greatly relieved by such a bath, continued for an hour or longer, as required.

ENEMA.—An enema (sometimes called rectal injection, and clyster) is a fluid injected into the rectum. Medical men often speak of a nutrient enema, meaning one not of water but of some substance of a nutritional nature from which the body presumably derives nourishment by absorption. But as used here the term means only water, or water containing some substance in solution (salt, soap), injected for the purpose of cleansing the rectum or colon.

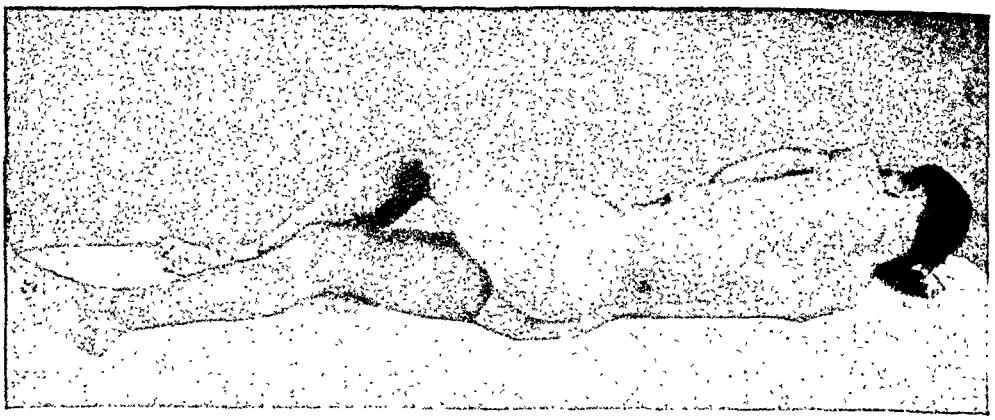
Forms of the enema

Enemas may be taken in any one of several postures; they may be taken at different temperatures; they may be "high" or "low"; and, as intimated, they may be of plain water or of water containing some soluble substance. The enema outfit ordinarily consists of a rubber bag, or metal or porcelain can, with rubber tube to which is attached a hard-rubber tip for insertion into the rectum.

An enema is an internal bath, regardless of the appliance with which it is taken. But a considerable number of people use a special outfit for taking what they call an internal bath. It is a flat rubber bag in the center of one side of which is an upright attachment with a hard-rubber rectal tip. After the bag is filled with water or solution at the desired temperature the patient sits on the bag, the tip being inserted into the rectum. An arrangement is provided for preventing the entry of the water into the rectum with too great force, which otherwise would occur from the pressure of the body upon the bag. This method seems to have no advantage over the ordinary enema, and it is less satisfactory in that it is practically impossible to reach the transverse and ascending colon without injecting such large amounts of water as to endanger the tone of the bowel.

The Enema as an Internal Bath

There are several methods of taking the enema. Many



In taking the enema in this reclining position the water is compelled to rise against gravity, but the position may be taken for the low enema, especially for those who are weak or bedfast. However, a more relaxed position is one with the body turned forward to a greater degree.

people take it while seated on the toilet stool. This position is strictly for the low enema, it being impossible in most cases to cleanse more than the rectum, or at most the sigmoid flexure of the colon, with the single injection of a quart or so. By a wise provision of Nature the large intestine or colon, while descending on the left side of the trunk toward the rectum, forms a loop immediately before it becomes the rectum. This is the sigmoid flexure or sigmoid colon. It is for the purpose (or it serves the purpose) of preventing too great a pressure of the contents of the colon upon the rectum and the sphincter muscles of the outlet. When the enema is taken in the sitting position it is difficult for the water to pass the sigmoid colon, and frequently the rectum alone is affected. This may be sufficient if only rectal irrigation is desired, but a better means of securing irrigation of the rectum is described under *Rectal Irrigation.*

Methods of Taking the Enema

If, in ignorance of the structure of the sigmoid, one injects too large quantities of water into the rectum and sigmoid, retaining all of this during the injection in the expectation that the water is reaching higher levels, there may result a definite injury to these structures. Especially is this true if the water is quite warm or hot, for then there will be the mechanical dilating effect of the water plus the thermic relaxing and dilating effect.

Best Postures for the Enema

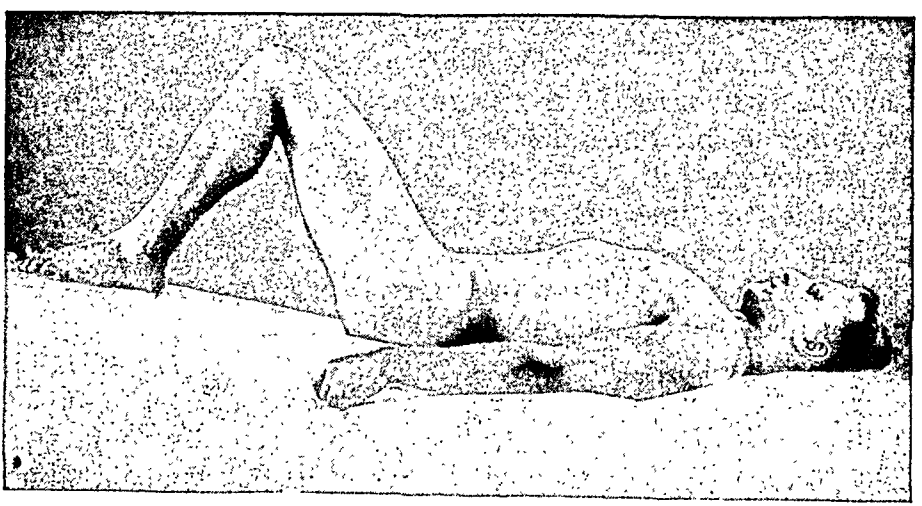
Some people take the enema while reclining on the right side. In this position the water is compelled to rise against

gravity while passing through the sigmoid colon, which makes complete filling of the colon practically impossible. Indeed, it is doubtful whether the flexure itself is often properly cleansed by enemas taken in this posture. But it is, notwithstanding, a satisfactory position for the low enema, especially for those who are weak or bedfast.

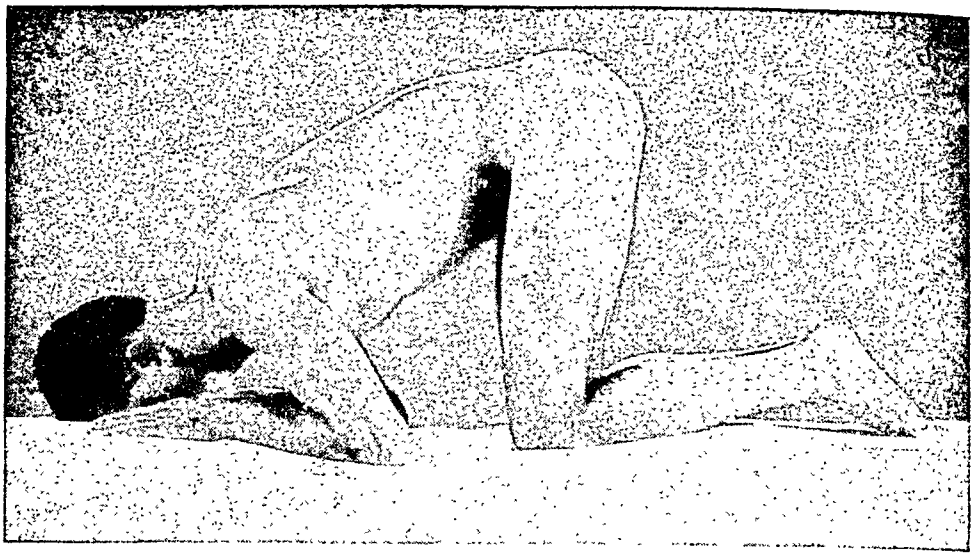
If the patient reverses the position and lies on the left side the condition is slightly improved. However, the transverse colon now becomes a perpendicular tube through which it is often impossible to make the water pass without the expenditure of a certain amount of force behind it, or the use of an amount of water that is detrimental; or without massage of the colon, which also may be injurious when considerable water is used or when certain abnormal conditions of the colon or other abdominal structure exist. But, again, this is a satisfactory position for the low enema.

Complete Flushing of the Colon

For complete flushing of the colon one of three methods may be adopted. Two of these are especially, though not necessarily, for weak individuals. In one the patient lies upon the back with the hips slightly elevated by a pillow or other means, or with the entire support elevated at the lower end. In the other the patient lies on the right side, the right arm behind the back, both thighs flexed, but the upper one more than the lower; but this is less effective than the following way.



Another position for taking the enema is one in which the patient lies upon the back with the hips slightly elevated, or upon a board or other support elevated at the foot end.



The enema may be given with the patient in the knee-elbow position, here shown, or in the knee-chest position. To assume position shown, the patient kneels down and leans forward until resting on forearms and knees.

The third and best is the knee-chest position. To assume it the patient first stands on his knees, then leans forward until resting on his hands and knees, and finally bends the elbows until his weight rests on the knees and chest. In this position kinks due to prolapse are usually taken out of the colon by the pull of gravity, and sometimes larger quantities of water can then be taken without inconvenience or injury. The advantage of having the body in an inclined position can readily be understood: gravity assists the entrance of the water into the upper sections of the descending colon, and seeking its level the water will cross the transverse colon and rise readily in the ascending colon until part of it reaches the cecum. However, after the full flow of water has been retained for a little time, it is sometimes better to turn to the right side for the final flushing of the ascending colon. With some people the knee-chest position is difficult or impossible. In such cases the weight may rest on the knees and elbows. This provides sufficient incline of the trunk for gravity to influence the entrance of the water to the higher portions of the colon.

The Knee-chest Position

The simplest method of taking the enema is to have a table, bed or couch by the wall where the bag or can containing water at the proper temperature has been suspended. The patient assumes the correct posture on this support. A little

vaseline or olive oil is applied to the hard-rubber rectal tip, the stop-cock is opened to allow the water to flow and expel all air from the tube; it is then closed, the rectal tip inserted into the rectum and the shut-off again opened. If after insertion the water flows too rapidly it may be regulated easily by the shut-off, or by pinching the tube between the fingers and thumb. If the water fails to flow the tip should be moved gently forward and backward in the rectum until the flow starts. The reservoir should be not over 2 feet above the hips.

A griping sensation or nausea is often experienced when fairly large quantities of water are used. This soon disappears, as a rule, if the flow is arrested for a moment. Naturally a sense of fullness will be felt as more water is taken in. If this is oppressive, the flow should be arrested for a time and, as the water finds its way into new sections or the farther recesses of the intestines, the sense of fullness will disappear. In many cases it is advisable to reduce the speed, force, or size of the flow, many people finding it impossible to take an enema of more than a pint or two without considerable discomfort. The speed and force of the flow may be regulated by lowering or elevating the reservoir above the hips; the force and the size of the stream may be regulated by controlling the caliber of the tube with the shut-off cock or finger and thumb.

Controlling Force of Injection

Except under expert advice, one should use water only for the enema. Table salt, Epsom salts, soapsuds, soda, or other additions to the water should not be used indiscriminately. Sometimes they are of some slight benefit, but usually the water will do all that the solutions will do, without producing irritation or endangering the patient in any way, which cannot always be said of these substances when wrongly used.

The temperature of the enema varies. Generally, perhaps, it is about that of the body (98 to 99 degrees). But experience has shown that more beneficial results will often be secured from water at a temperature several degrees lower—from 80 to 70 degrees. An enema at such temperature will have not only a cleansing but a tonic effect, thus making unnecessary such an aid to elimination for long periods of time. The best temperature, however, will usually be indi-

Enema, Temperature of

cated by the condition of the patient and the purpose for which the enema is used. When there is low vitality, the hot enema (104 to 115 degrees) will often act as a powerful and yet safe stimulant and do far more effective work as a cleansing agent than one at lower temperature.

Use of the Warm Enema

The *warm enema* is relaxing, and habitually used soon loses its efficiency. Often the bowel becomes enormously stretched because the tone of the muscles of the intestinal wall has been reduced from day to day. When the enema is employed daily for a more or less prolonged period, as frequently happens, two quarts of water should be the maximum quantity used. Generally one quart will be sufficient, and the small quantity is less likely to produce harmful effects. Large quantities will stretch the colon or lower part of it, and may destroy all tone. The colon has a capacity of a gallon or more, when not filled with feces or residue that will become feces. But when repeatedly filled to this capacity with warm water (its capacity increases when warm water is used, because of the relaxing effect) atony is very likely to result. The use of a pint or so of cold water after a warm enema may counteract some of the stretching and relaxing effect; but in any case it is better to avoid large quantities—above two quarts—for regular use. A pint of cold water may be used daily without harm, since the cold water energizes the intestinal muscles and nerves. Ordinarily a temperature of 75 degrees, or within three or four degrees of this, above or below—is best. Despite this caution regarding warm enemas, the use of the full hot enema in certain emergencies is highly beneficial.

The enema should really be regarded only as a corrective measure, and not as a health measure for daily use. One should learn not to depend upon it, for such vigor and functional tone should be established and maintained by other means that the bowels may be kept in good condition under ordinary circumstances without such outside help.

Excessively large enemas and too frequent use of the enema are not to be advocated.

Amount of Water to Use in Enema

It should be self-evident that the amount of water to be injected should be limited to the natural capacity of the individual, for any attempt to force into the bowel an excessive quantity might produce injury which it would take some time

to correct. Many people have used such large quantities (usually of warm water) for such long periods of time that their capacity is enormous. This, however, is not their normal capacity, and one beginning the use of the enema for special effects and conditions should not be led into forcibly injecting large quantities simply because of what someone else in an abnormal condition can do. There unquestionably is danger in using too large quantities of water, especially warm water; but the danger may be largely nullified in the average case by a fast. The musculature of the bowel, as a rule, is greatly increased in tone by this means, but there are those who lose tone of all tissues by the fast to such an extent that very large enemas might easily result in permanent dilatation of the colon. Consequently it is not advisable even for a fasting person to use more than moderate amounts of water in enemas. One's fast will do some of the cleansing for which the large enemas would be taken.

The Enema: Its After-effects

When warm water has been used with effect in bringing forth solid waste material, future elimination will be aided by following the discharge with the injection of a pint or so of water at a temperature of from sixty to seventy degrees, to be retained if possible, but not necessarily. The cold water has a stimulating and tonic effect upon the musculature and mucous membrane of the colon and an energizing effect upon the nerves and nerve centers controlling the intestinal muscles. Hot or warm enemas rarely should be given without a finishing small cold enema.

The enema is useful not only for its commonly accepted purpose of flushing the large intestine or its lower portion. It has other uses and benefits that should be thoroughly understood. Water injected into the colon is rapidly absorbed, as indicated by the copious discharge of urine immediately or shortly following the injection. The hot enema has a more pronounced influence upon the kidneys than the cold enema. This effect indicates clearly that elimination by means of the kidneys is greatly encouraged. Since the water is taken up from the colon by the blood-vessels, the body's blood supply thereby becomes somewhat more diluted, which makes it possible for it to absorb more toxins and toxic deposits from organs and tissues. The temporary filling of the

Enema, Uses of

blood vessels and their mild distention stimulates them to better action generally. In case of acute anemia due to hemorrhage the quantity of blood may be greatly and quite quickly increased by retained neutral enemas of moderate size combined with the drinking of water.

The *hot enema* has been found of great benefit in cases of infantile diarrhea, gallstone colic, excessive uterine pains during the first stage of childbirth, and the irregular contractions that sometimes occur before childbirth. It is beneficial also in all those cases wherein rectal irrigation does such excellent service—in pelvic inflammations of both the male and female. By means of water injections into the lower bowel it is possible to come more nearly in contact with the pelvic organs than by any other safe and effective procedure. In cases of pelvic inflammation accompanied by great local pain hot enemas are of the greatest value. Painful menstruation, ovarian inflammation or distress, prostatic inflammation and other abnormal pelvic conditions are often immediately relieved by hot enemas or rectal irrigations. When combined with the fast they are of the highest value in reducing such inflammation, and therefore favoring a cure.

Many a case of collapse has been materially helped by the hot enema, and it is also very useful in conditions which are accompanied by a pale skin and weak pulse. In cases of this character it is often advisable that a cold friction rub or scrub be given briefly and speedily to the whole body immediately after the hot enema. The hot enema is the best means of temporarily clearing the intestinal tract of abnormal chemical products resulting from putrefaction within the bowel, though it cannot be relied upon to keep the intestinal flora normal. This must be done by a suitable diet with free and regular water drinking; and the small cold enema should be used for final correction of bowel sluggishness, if diet and water drinking combined with exercise do not bring about spontaneous correction.

Hot Enema, Uses of

In cases of suppression of the urine and in kidney congestion or inflammation the hot enema is of great value, being much better than warm enemas, since the hot enema is more readily absorbed because of the increase of blood pressure and acceleration of the heart action. In cases of suppression of

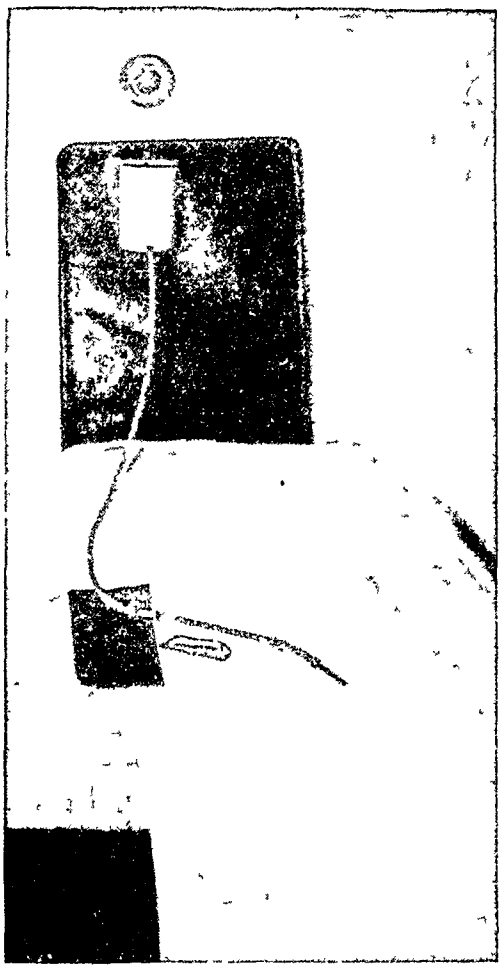
urine, life has been saved by the repeated employment of the hot enema at intervals of from one to three or four hours. It has been of great value also in some forms of retention of urine. In such cases the temperature of the enema must not be below 110 to 120 degrees.

In cases of threatened collapse, in typhoid fever, cholera, and yellow fever, in which life is threatened by the absorption of the poisons the body is endeavoring to eliminate in the form of the "disease," the hot enema is of inestimable value, especially when accompanied by the fast.

It must be remembered, however, that in typhoid fever and some other intestinal conditions, there are often ulcers present in the small intestine, and it is not impossible that hot enemas, by producing a hyperemia of the colon may also produce a similar condition in the small intestine, with resulting possibility of hemorrhage. All acute affections should be treated by the fast, whether or not the enema is employed, but the enema aids greatly in eliminating the intestinal toxemic condition underlying or partly responsible for the appearance of the disease.

The *cold enema* is of the highest value in cases of fever. It is not only instrumental in reducing the temperature, but by stimulating the action of the kidneys and the skin it aids in the elimination of the cause of the fever. In such cases as typhoid fever (See also *Brand Bath*) the body temperature can be readily controlled by the cold enema, repeated as often as necessary. In addition to lowering the temperature by the direct action of the cold in extracting heat, it keeps the colon cleansed and encourages the action of the kidneys, liver and skin, all of which are most desirable results to obtain in such cases. In case of jaundice, the cold enema may be used, but only after a fairly hot enema. Most people employ the warm or hot enema for constipation. Such an application is satisfactory for immediate clearing of the lower bowel; but unless followed by a cold enema the permanent results will not be desirable. The best treatment for constipation is the cold enema, for this is tonic not only to all the structures of the intestine that it reaches, but also, by reflex action, to the upper intestines as well. While the cold injection drives the blood temporarily away from the intestines, upon reaction it surges

Use of the Cold Enema



The equipment needed in giving the low enema is shown above. Beside the nozzle appears a collapsible tube with vaseline, which is used to lubricate the nozzle. In many cases this enema satisfactorily clears the rectum and the sigmoid.

toward and into the intestinal walls. This accounts for the benefit of the cold enema in constipation, especially when this condition is due to dryness of the fecal waste or atony of the rectum.

Reasons for the Graduated Enema

The *graduated enema* is employed in many cases where the use of the enema has become a fixed habit. This enema is employed in the same manner as are the other enemas, except that gradually from day to day the temperature and amount of the water are reduced. The warm enema is followed by the cold enema, which alone is used after several days of reduction in this manner. A degree or two is sufficient daily reduction in water temperature, especially where the colon is distended and atonic. The amount may be reduced two ounces a day in old cases, or every two or three days.

The Low Enema

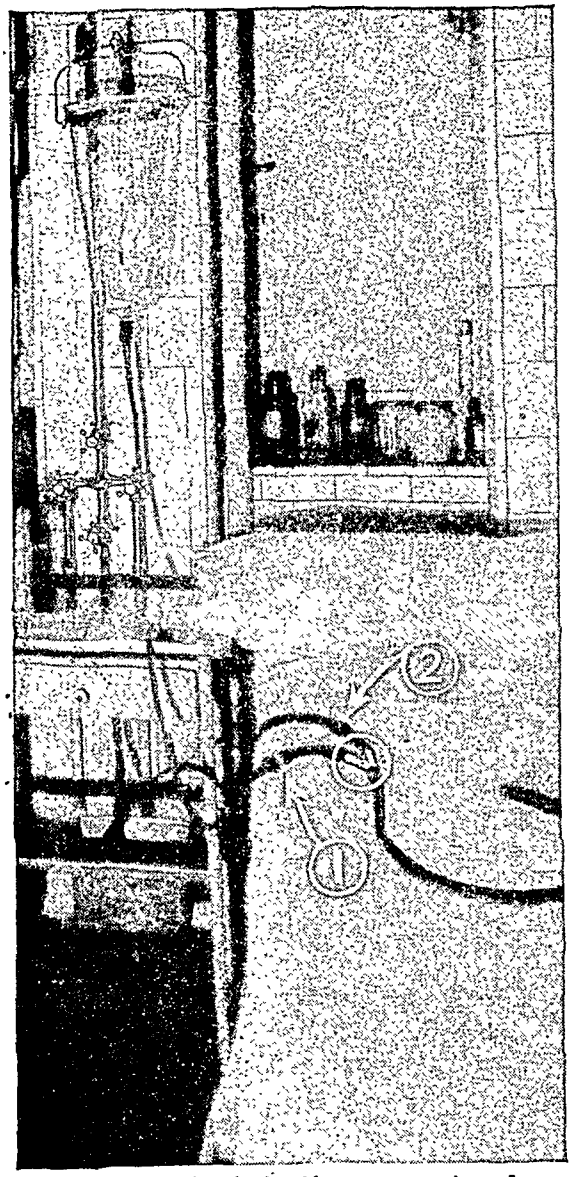
The *low enema* is the one usually employed, and as a rule is the form referred to by the simple term *enema*. The low enema consists of one and one-half to three pints of water injected by means of the short hard-rubber rectal tip, the water reaching only the rectum, the sigmoid colon, or perhaps the entire descending colon, according to the condition of the lower bowel, the position of the body when the water is injected and the amount and temperature of the water used. In many cases of constipation in which the feces collect in the rectum or sigmoid and become hard, perhaps in the form of pellets or a mass difficult to pass, the low enema is often fully satis-

factory. In these cases, all that is necessary, usually, is to stimulate the rectal muscles to contract to expel the feces; or possibly, in case of "tight sphincter," to relax and allow passage; or to break up the mass of residue so that it can pass. This form of enema is satisfactory for other types of constipation also. It will not clear the entire colon in many cases, but occasionally, by reflex stimulation of the upper sections, it may bring about evacuation of whatever "floating" residue there may be in these sections, though "pockets" will not be cleared nor will the concrete-like coating of the colon present in many individuals be dislodged.

The *high enema* is one that is designed to reach the upper sections of the colon, thus more effectively cleansing the entire colon than the low enema does except in rare cases. The amount of water usually injected for the high enema is about two quarts, but three or four quarts are often used with benefit, and sometimes the larger amounts seem necessary. However, it is often much better to follow one two-quart enema with a second injection of the same size, rather than risk overdistention by the larger amounts. A complete filling of the colon is not necessary to cleanse it effectively, nor is it advisable. But if sufficient water is injected to saturate thoroughly the residue in and lining the walls of the colon, some cleansing of the tube will be effected. If this is repeated day after day, for from three to a dozen or more times, even the cement-like coating of some colons will be dissolved or dislodged and washed away. It should be repeated daily until gas and foul odors no longer are formed in the bowel, but this will not take place unless the diet is such as not to contribute to these abnormal conditions.

Use of the High Enema

In the high enema barely warm water should be used for the first injection, in such quantity as can be borne easily by the patient without distending the colon—the quantity being reduced from day to day after all accumulated waste has been removed. After expulsion of the warm enema a small amount (a pint or so) of water at 60 to 70 degrees should be injected, this to be retained if possible, for at least several minutes. The quantity of warm water is gradually reduced until in time only the cold enema is employed, then this is gradually reduced and finally dispensed with. This method is used with



The High Enema

In the colonic irrigation apparatus here pictured, water passes downward from large glass jar into tube marked (1) thence through the specially constructed double tube on bed into the colon. The return flow of water and excretions passes through the tube marked (2) to a receptacle for waste. A continuous flow of water into the colon, and of water and excretions out of the colon, is thus maintained.

the high and low enemas.

The positions which may be assumed for the high enema have been given under *methods of taking the enema.*

The high enema is a form of *colonic irrigation.* It is of extreme value in the treatment of sluggishnes, loss of tone and dilatation of the large intestine, which permits the individual to retain immense quantities of putrefying and fermenting fecal wastes. Digestive symptoms of various kinds and degrees, including biliousness, insomnia, neurasthenia, lassitude, and easy exhaustion, besides a wide variety of other symptoms due to chronic intestinal toxemia, are relieved with surprising suddenness in many cases by the high enema or colonic irrigation. When they are of such nature, or from such causes, that they cannot be so quickly relieved, they will usually be reduced in severity almost from the first enema and will gradually become less and less pronounced as the enemas are continued. Among the numerous conditions that are greatly benefited by high enemas are affections of the liver and gall-bladder. See *Rectal Irrigation.*

EVAPORATING COMPRESS.—See *Compresses.*

EVAPORATING SHEET.—There are times when it is essential to reduce the temperature immediately. This can be done very satisfactorily by enveloping the patient in a sheet wrung moderately dry from cold or hot water as the case requires, and then allowing the cooling to take place by evaporation, which may be encouraged by fanning the sheet. If the sheet is kept moist by sprinkling, the cooling effect may be continued as long as necessary. The cold evaporating sheet, of course, is a more vigorous treatment than the hot evaporating sheet. The latter is used when a combination effect of heat and cold is desired, or when the patient is not sufficiently vigorous for the cold sheet. The sheet is rewrung from hot water (as hot as the patient can comfortably bear) every two to four minutes. It may also be fanned to increase evaporation. As it cools gentle friction may be given. The hot sheet is used more often than the cold sheet; but it must be applied quickly if the effect of heat is to be secured. When the cold evaporating sheet is used, it is usually best to rub the body well during the application, to keep up the skin circulation. Since there is little or no reaction when these applications are made, they are not employed often, other cooling measures being given the preference.

Hot and Cold Evaporating Sheet

FOMENTATIONS.—Some people use the term "hot fomentation." This term is incorrect, the adjective "hot" being superfluous, because no compress can be a fomentation unless it is hot. The fomentation is simply a very hot compress (See *Compress*); but instead of linen cloths, folded flannel cloths are used when available, though when nothing else more suitable can be secured, heavy thicknesses of towels, cheesecloth, or other material may be used.

In using the fomentation care should always be taken to have the flannel cloths large enough so that, when properly folded, they will more than cover the part affected. For instance, if one were using a fomentation to the appendix region, which is very small, it would be useless to apply cloths 5 or 6 inches square. They should be large enough to cover over the entire abdomen, or an area at least 12 inches square. However, in the case of a very small person cloths 8 inches square would be as effective as much larger ones for a large

Fomentation

person with broad abdomen. The mistake of using cloths too small is one often made, and it is important that it should be avoided.

Another mistake is that of using cloths too thin. There should be three or four thicknesses of a good grade of flannel, when possible. Most other cloths need to be in more layers than flannel. Thinner cloths *may* be used, but they necessitate such very frequent changing to maintain high heat that they are unsatisfactory. Unless the patient is on a special treatment table, a rubber sheet or cloth should be placed underneath him to keep the bedclothing from becoming wet. Oilcloth may also be used. As the cloths are to be applied time after time, there is almost certain to be considerable moisture upon the patient's support. All necessary precautions must be taken to keep the extremities warm during the application.

Fomentation, Application of

When an abundance of water is provided and a wringer is at hand, the flannel may be placed in the hot water and wrung out by the machine. But when no other appliance is available it is best to place the flannel, after being dipped in the hot water, in a large towel or cloth folded in such a way as to have the ends free from the fomentation cloth. It can then be wrung out by hand by twisting the ends of the towel or cloth. Or very large fomentation cloths may be used so as to have dry ends, these being folded upon the patient in such a way as to have the dry ends on top.

When very hot water is used the fomentation cloths should be wrung thoroughly, otherwise there is danger of blistering the skin of the patient. In some cases this might be serious, but in all cases it should be avoided. Sometimes a single layer of either dry or wet flannel is placed next to the skin of the patient before applying the fomentation cloths. A rough Turkish towel wrung out of hot water also serves the purpose admirably. Care must always be taken, however, to see that it is not too hot when applied. Vaseline or cocoa butter should first be applied to the surface to be covered with cloths, as a protection to the skin and to favor the formation of vapor beneath the compress.

Fomentation, Temperature for

The attendant should run his hand rapidly under the fomentation after application to determine whether it is too hot for the skin. If it is, a few movements of the hand in this

manner will cool it; or it may be lifted for a moment, perhaps lightly waved in the air, to induce cooling. It is far better, however, to have it at the proper temperature before application, and to leave one cloth on the area until the next one is at a temperature that can be borne. Once it is on it is better to leave it there and cool it by the hand, if possible and necessary.

When continuous great heat is required, the fomentation will need to be renewed at the end of every four or five minutes, or at even shorter intervals. In some cases it is sufficient to apply the fomentation, with dry flannel, and add a hot-water bottle to help maintain heat. In arranging or reapplying the fomentation cloths great care must be taken that the surface is not dried by evaporation, or the beneficial effects of the fomentation will be lost. The renewal cloths should always be prepared before the cooled one is removed from the body.

In concluding fomentation treatment there should always be a final cold application. The part may be covered with a towel wrung from as cold water as is obtainable, or, in some instances, it may be rubbed with a piece of ice. The cold application is to be made immediately upon the final removal of the fomentation cloth. It should completely cover the reddened area, and it should remain for from one-half to one minute. After its removal the part should be gently rubbed and then covered at once with a dry flannel. However, when the fomentation has not been given for the relief of pain, it will do no harm to allow some degree of cooling of the part before applying the final dry flannel. In many cases of acute inflammation of the joints (arthritis) it is advisable to apply the heating compress immediately upon removal of the fomentation. This is beneficial also in pleurisy and pneumonia. See *Heating Compress,* under *Compresses.*

Concluding Treatment after Fomentation

The fomentation is a local vapor bath. That is, beneath the cloths, vapor forms and remains there in contact with the skin as long as the fomentation is in place. This is beneficial to the skin as well as to the underlying condition. The above method of application is preferable when possible. In some instances the hot water is not available and in such cases it may be possible to improvise some method of heating the

water, or the cloths after being saturated with water. After the first cloths have been heated and applied the renewal cloths can be heated by the time they will be required. For instance, the cloths may be wet with cold water (if necessary) and placed on the bottom of a pan turned upside down over a flame; or they may be wrapped about a stovepipe; or some other method may be found convenient. This is such an admirable application that when it is indicated, an effort should be made to obtain it if at all possible.

Fomentation, Uses of

The fomentation, especially when used alternately with the heating compress, is particularly indicated when swellings are to be reduced, or deposits about joints or in soft tissues (exudates and affusions) to be absorbed; when increased quantities of blood are needed locally; and when the functional activity of a part is sluggish, requiring awakening. The fomentation is used especially for the relief of pain. Very hot applications (140 to 160 degrees) lessen the sensibility of the nerves of the skin; and, while the first effect is stimulating, the secondary and continuous effect is soothing. However, few skins can endure a temperature of 160 degrees. In all cases of acute inflammation of the surface structures, the fomentation may be used for five to ten minutes every two or three hours to advantage; and for the relief of severe pain it perhaps has no equal in all therapeutic measures.

There are so many abnormal conditions that are successfully influenced by the fomentation that it is impossible to enumerate them all. Among these are inflammations of the abdominal and pelvic organs (female and male), including the bladder; of the eye, ear and other head structures, including meningitis; of the joints and spine; of the neck and throat, including tonsillitis, diphtheria, laryngitis and croup; of the chest, including pleurisy and pneumonia; and in such conditions as hemorrhoids, inflammation of the testicles, boils, acne, hysteria, acute St. Vitus's dance, general tic, neuroses of occupation, typhoid fever, smallpox, influenza, scarlet fever, diabetes, gastric and duodenal ulcer, hyperacidity, cholera morbus and cholera infantum, colic, wryneck, irreducible hernia, inflammation of the heart, coughs, gallstone colic, lymphangitis, neuralgia, neuritis, the pain of pericarditis, sciatica, superficial abscesses, adhesions, bone diseases, and to

relieve the pain of beriberi. Many other conditions are benefited by these applications, such as carbuncle, cramps, epididymitis with pain, nervous excitement, facial paralysis (locally), felons, flatulence, suppurative inflammation of glands, spasm of the glottis, anemic headache, acute heart conditions with slow pulse, heart-failure, hiccough, acute indigestion, influenza (to spine), inflamed joints; to the spine in after-treatment of malaria; acute prostatitis, stiff neck; to the spine after the second day in improved cases of meningitis, toothache, vomiting (to abdomen), vulvar diseases, abdominal pains, suppurating abscess, angina pectoris, anthrax, bladder conditions, congestion of the brain (to upper neck).

Precautions in Applying Fomentations

In using fomentations care should be taken to insure the greatest good without detrimental direct or after effects. If they cause profuse sweating, it would be better to use some other measure, such as the hot sponge bath. In cases of paralysis, or when the skin nerves have deficient sensibility, much care will be necessary to avoid burning the skin, since skin burns in such cases may result seriously. On the other hand, the fomentations should be hot enough to be effective. If the cloths are not changed often enough to keep the skin hot, not only will they not be effective but they may have an undesirable effect. If the skin is very sensitive, however, very hot cloths may intensify the trouble, and cloths at slightly lower temperature, or some other mode of treatment, may be necessary. In all cases there should be a liberal spreading of vaseline, or other emollient, to the skin over which the fomentations are to be applied; and after practically all such treatments there should be not only a short very cold local application, but often a mild general cold bath, such as a shower or cold wet-towel rub. At least the mild perspiration should be wiped from the body with a dry towel, then the body covered enough to prevent chilling but not enough to reestablish perspiration.

In many of these conditions, however, cold compresses or ice-bags are used with great success, especially where there is much pain, with inflammation.

Fomentation, Duration of Application

The nearer the fomentation is to the seat of the inflammation, the shorter should be the application. For instance, for boils the application should be short, though repeated quite often; for deep-seated abdominal inflammations they may con-

tinue for from thirty to sixty minutes or even longer. In cases of soft, pendulous, or relaxed abdomen, especially when there is a tendency toward the development of considerable gas in the abdomen, the abdominal fomentation should not be used.

If these precautions and exceptions are observed the fomentation may be used successfully. (See also *Hot-Water Bags.*)

FOOT-BATHS.—The foot-bath is not usually considered by the average individual, but if properly given considerable benefit may be secured from it in certain abnormal conditions. These beneficial effects are possible because the foot, especially the sole, is in direct connection with nerve centers governing the circulation in the pelvic and abdominal organs, while the brain also is influenced through this area.

The Cold Foot-bath

The *cold foot-bath* is taken in a suitable vessel having three or four inches of water at a temperature of from 45 to 55 degrees Fahr. The feet should be warm before the bath, and friction should be applied during its progress, which may be for from one to four or five minutes. The patient may rub one foot with the other, or the hands of the patient or of an attendant may give the friction. To prove the effect of such an application upon the pelvic viscera observe how quickly the bladder usually contracts, necessitating urination.



The cold foot-bath requires a vessel having 3 or 4 inches of water at a temperature of 45 to 55 degrees. Friction should be applied during the bath, which may last for from one to five minutes.

Among the conditions in which this bath is of value are hemorrhage from the uterus, and congestion of the brain, providing the bath is not over one minute in duration. The higher temperature mentioned is excellent for feet that are habitually cold, also for feet that perspire considerably. Friction is a necessary part of the treatment in these cases, and the bath should continue for a minute or more. It may be repeated daily or even twice daily. If the feet are well warmed before the bath, the cold foot-bath is excellent for sprains and strains and other inflammations, except those of a rheumatic nature. In these cases the temperature should be somewhat higher (58 to 68 degrees), and the bath should continue for from five to fifteen minutes. When there is inflammation of the bladder, pelvis, uterus, tubes, prostate or rectum, or congestion of the uterus, liver, kidneys or other pelvic or abdominal organs, this bath should not be employed. The hot foot-bath is better in these cases. The cold foot-bath, however, is very ef-

Indications For Cold Foot-bath



This is the flowing foot-bath with home apparatus. The attendant pours hot water over the feet of the patient who is blanketed to induce perspiration. This method may also be used for the alternate hot and cold foot-bath, by the alternate pouring of hot and cold water from pitchers. The patient's head and throat should be well covered, and a glass of hot water or unsweetened lemonade should be taken each ten minutes of the treatment.

fectual in incontinence of urine; also in cerebral congestion.

A variety of the cold foot-bath is the *shallow foot-bath.* This is a foot-bath with water very cold and only sufficient to cover the toes. After half a minute in the water the feet are lifted one at a time and frictioned and the soles slapped. The bath has the same effects and indications as the cold foot-bath just described, but is a somewhat less extreme procedure.

Shallow Foot-bath

The *flowing foot-bath* is a further modification of the cold foot-bath, being, in reality, a modification of the shallow foot-bath. Very cold water is used, at a depth of half an inch, the drain in the bathtub (if this is used, and it is best) being so arranged that this depth will be maintained. That is, water is entering the tub and escaping at the same time. A better arrangement would be a portable hand spray or a plain tube, at the end of the bathtub opposite the drain, which would allow the water actually to flow from one end of the tub to the other.

Flowing Foot-bath

A form of flowing foot-bath useful when a bathtub is not of convenient access, may be provided by the use of a large pitcher in conjunction with a pan of proper capacity. Hot or cold water may be used for such an improvised foot-bath as treatment may require. The use of hot or cold water alternately also is possible by this method.

During the flowing bath each foot rubs the top of the other foot in alternation, and the bath continues until the toes become red from the reaction. This bath has effects similar to those of the cold foot-bath, but more pronounced. The indications and contraindications are the same. It is an excellent bath for neurasthenics, who habitually have cold feet and brain congestion, and in cases of insomnia due to cold feet. But in the latter condition better results will be secured if a hot foot-bath precedes the cold one.

The *hot foot-bath* is taken in very hot water, the temperature being gradually but rather quickly increased from moderately hot to 115 degrees or even several degrees above this. The feet should be entirely covered with the water. The bath continues for from five to twenty minutes, sometimes longer. It is terminated by a quick, decidedly cold application, by pouring or, preferably, a spray, or by rapidly moving the feet back and forth in a basin or tub of cold water.

The Hot Foot-bath



In the hot-foot bath the temperature of the water is gradually raised from moderately hot to 115 degrees or even higher. It lasts from five to twenty minutes, and is terminated by a cold application.

Hot Foot-bath, Effects

By the hot foot-bath the blood vessels of the lower extremities and of the pelvis are dilated, thus allowing the blood congesting the brain and upper parts of the body to descend, with relief of the congestion. Through the increased circulation in the pelvis the hot foot-bath becomes a valuable measure in suppression of menstruation, in atonic bladder conditions, and in enlarged prostate. In rheumatism, gout, and neuralgia of the feet and in sprains of the ankle, the hot foot-bath is excellent, especially when given two or three times a day and continuing for half an hour or so each time. It is an excellent measure for the prevention or relief of a cold due to chilling of the feet, for which purpose it has been used for centuries. Pelvic congestions may be relieved by the prolonged barely hot foot-bath, or by the short very hot foot-bath. Other cases in which the hot foot-bath is to be recommended are general colds, congestion of the head, facial paralysis, in beginning fevers, in headache, menstrual mania, and in attacks of asthma. Except for those of very robust constitution the cold sitz-bath should be immediately preceded by a hot foot-bath, and in most cases it is preferable to use it.

The Alternate Foot-bath

The *alternate foot-bath* is one in which the feet are immersed alternately in hot water for a couple of minutes then

in cold for half a minute, there being from two to four or five alternations. This bath is very helpful in correcting the circulatory abnormality in chilblains and in habitually cold feet and sweating feet. See also *Shallow Bath.*

FRESH-WATER BATHING.—See *Open-Air Bathing.*

Dry Friction Baths

FRICTION BATHS, DRY.—For increasing the circulation in the skin, and thus not only stimulating its function of throwing off waste products, but also, through the skin, improving the circulation throughout the body, few treatments surpass the dry friction bath.

In order to be well and strong there must be not only a clear skin but an active skin. For the skin is the most important organ of the body. It is not always the clearest and most attractive skin that is the most active and healthy, but the combination of a clear and an active skin should be sought and worked for. The skin area may total from 15 to 20 square feet (nearly 3,000 square inches) and throws off impurities through millions of pores. The pores of many people, however, manifest but little activity. Their skins may be said to be "dead," lifeless. Too many people wear much heavier clothing than they actually need for warmth or decency. The air and sunlight rarely come in contact with their skins, bathing is neglected or enervating hot baths are taken exclusively, and the superficial and general circulations are sluggish. The functions of the skin, therefore, are performed very inadequately. It becomes rough and coarse, almost like sandpaper to the touch, or moist and clammy and repellent.

Skin Care Necessary

A normally healthy skin is smooth and soft like satin and it has been estimated to possess altogether about eight miles of gland pores. In order to secure such a skin or to maintain it in this condition, not only is a proper diet essential but direct care of the skin itself is necessary. The dry friction bath is one of the very best means of promoting the health of the skin. Perfectly pure blood that circulates normally depends in no small measure upon active pores. Many diseases can be prevented or avoided when there is an active skin to assist the other depurating organs of the body. Inactive skin necessitates extra work for other organs, chiefly the kidneys, which may become irritated, congested, or inflamed because of the larger amount of impurities they must eliminate.

Not only does surface friction thoroughly awaken every part of the surface of the body, but, through the nerve-ends in the skin, it affects the entire nervous system, which may be soothed, stimulated, or overexcited by this means, in accordance with the susceptibility of the individual and the degree and nature of the friction.

Furthermore, the act of frictioning is excellent exercise. It brings into play nearly all the muscles of the arms, shoulders, chest, abdomen, the back between the shoulders and the waist, and, if the various motions are executed vigorously, even a measure of fatigue may be produced. Because of the acceleration of the circulation throughout all the organs as well as the skin, the exercise thus entailed, when such friction is self-applied, is almost as beneficial as the friction itself. But one should not rely upon it to provide all the body needs. It is useful merely as an addition to the daily régime, in most cases favorable in degree and kind and taken, usually, at a favorable time. Yet one must guard against exercising sufficiently to bring about a too vigorous reaction.

Friction as an Exercise

The best time to take a friction bath is immediately upon arising, though many people prefer to take it immediately before retiring, especially if there is difficulty in getting to sleep or in sleeping soundly. If any exercise is taken at the same period, it should precede rather than follow the bath. One may use either the dry hands, a flesh-brush, or a coarse towel in giving the friction. Excellent bath mitts also may be procured in some localities. The writer knew a man who used nothing but corn-cobs. His skin, at the age of seventy, after fifteen years of such frictioning, was very soft and pliable. The treatment is an excellent one for an attendant to give to a patient, but friction by an attendant usually constitutes massage.

Best Time for Friction Bath

Almost anyone can give himself a satisfactory friction bath without instruction if a little ingenuity is used to devise motions and methods of reaching every portion of the surface. But there are some things about friction bathing that one should know if the treatment is to be most effective, and a study of the varieties of movements given in the discussion of *Massage* will prove useful to those who wish to spend their time and energy to the best advantage. When the hands are

used it should be borne in mind that friction upward or toward the heart aids circulation better than friction from the heart, and is much better for the blood-vessels of the skin. Most hand friction, therefore, should be toward the heart. Other movements that may be employed are circular, in which a wringing or twisting movement is secured; and rotary, in which the hands circle upon or over the tissues.

Friction Baths and Massages

A perfectly satisfactory way in which to practice friction is by the use of an ordinary stiff wet scrubbing brush. If the skin to be frictioned is very tender the brush is not rubbed over it but is pressed firmly down upon it, and a circular motion is made upon the skin, carrying it around over the tissues beneath.

Other equally satisfactory ways by which many people may prefer to apply self-friction are by the use of a coarse towel. Several of these are illustrated under *Towel Rub, Cold.* Turkish towels or heavy coarse linen or crash towels may be used; there are also specially ribbed towels that are excellent. Since there is considerable friction and pulling upon the towel itself, it is important that one secure good towels. Also these should be of good size. It is advisable to follow the friction bath immediately with a cold bath, which may be taken with a wet towel, sponge, or scrubbing brush, or a shower or a spray, a splash or immersion, according to convenience and preference. However, if one takes the friction daily, the water bath may be occasionally omitted without loss of benefit.

Friction Bath, Equipment for

One advantage of self-treatment is that one can regulate the pressure and force of friction to suit one's own sensitiveness. There are some skins that are extremely sensitive and easily wounded or scratched. This condition can often be largely overcome by gradually increasing the friction and slowly lowering the temperature of the water bath that follows. If the friction causes irritability or disturbs sleep, it has been given too vigorously. But people so affected usually humor themselves too much, and in consequence never develop any degree of "hardness," or hardiness, of the skin. Instead of towel friction or fairly rapid straight friction with the hands, kneading with moderate friction may usually be given to persons with sensitive skins. The kneading encourages reaction, which very light friction discourages. For this reason very

light friction should not be used after a cold bath unless in an occasional case where retardation of reaction is desirable. In cold weather or in the case of weak persons, it may so delay reaction as to be positively detrimental to health. But an especially vigorous friction following a bath may also have very undesirable results, in that it may depress heart and lung action and result in a secondary chill; or, if it creates sweating, it may bring on depression, thus dissipating all the benefit from what should have been a tonic application.

In summer it is often undesirable to follow cold baths with very vigorous friction, for perspiration is easily established and the reaction may be too vigorous for the individual's physical good. In the summer when one has taken a cold bath as a tonic measure and to cleanse and cool the body, light friction outward from the heart will retard reaction, thus enabling one to feel comfortable for a longer time.

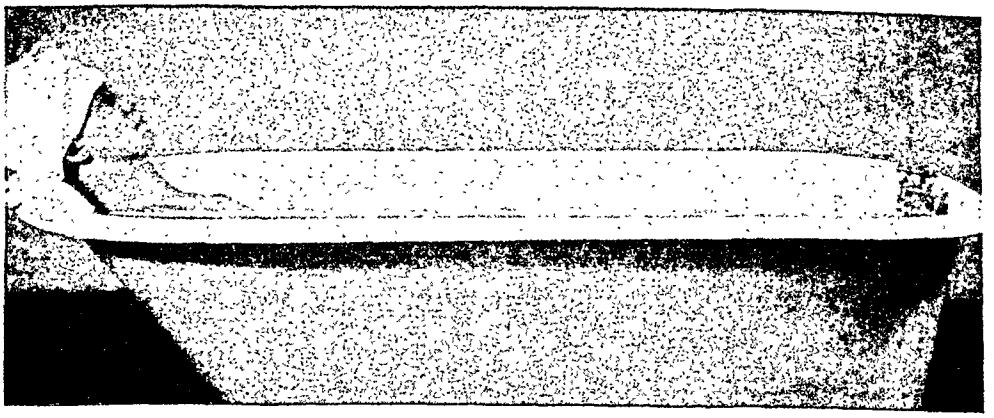
When reaction is known to be habitually excessive, with perspiration developing easily, it is usually better to dry by patting rather than by vigorous or even very light friction. In addition to this the body should be exposed to the air for a few seconds occasionally, so that the air will retard reaction. Even a fan or towel may be used to give a slight breeze to the body to delay reaction in these cases. Degrees of Friction

It should be remembered that, if one uses the hand for friction, there is likely to be irritation of the skin if either the skin or the hand is moist and the friction continues for some time, or is very vigorous. The irritation to the skin may be comparatively insignificant; but in some cases there may be enough general nervous irritation created by the skin irritation to affect harmfully the individual's health.

When the vitality is very low, great good may be accomplished by giving dry friction exclusive of all other baths (except sun and air baths) for some time. In these cases the body may be frictioned with some cloth which is not harsh, such as flannel or a mitt made from Turkish toweling, or a soft flesh-brush may be used beneficially.

When the skin is affected with eruptions of any kind, friction cannot be used unless the eruptions are strictly local, when the unaffected parts may receive the treatment.

Dry friction baths are useful in a very wide variety of dis-



In the cold full bath it is helpful to place a saturated cold towel, or cold turban, about the head.

orders, among which are catarrh, defective circulation, trembling of eyelids, hysteria, leucorrhea, locomotor ataxia, obesity, masturbation with enervation, rickets, ringworm, scrofula, and scleroderma, seminal losses, certain skin diseases, sterility, and tuberculous disease of the spine (Pott's disease). They can be used to advantage in the after-treatment of sunstroke cases, and are frequently recommended in the treatment of syphilis, sleeping sickness, cretinism and tuberculosis.

Full Baths or Immersion Baths

FULL BATHS OR IMMERSION BATHS.—The full bath or immersion bath is one in which the entire body except the head is under water. By the term immersion bath is usually meant a full tub bath. A plunge, or a dip in ocean or lake, is no less an immersion bath, but the open-air baths naturally cannot be controlled for specific effects.

The *Cold Full Bath.*—This is an immersion bath at a temperature of from fifty to seventy degrees, lasting only long enough to get completely under the water or, sometimes, for as long as twenty seconds. It should be entered as quickly as possible. It is advisable to wet the head and face, often the neck and chest, with water several degrees colder than that of the bath, immediately before entering it. And unless one is very vigorous, it is best to have a saturated cold towel (cold turban) about the head. Generally either the bather or an attendant should rub the body more or less vigorously during the bath. If the bath continues longer than a sudden immersion and then out, it is best for the bather to sit erect in the tub and rub the legs and upper part of the body, except the

Procedure in Cold Full Bath

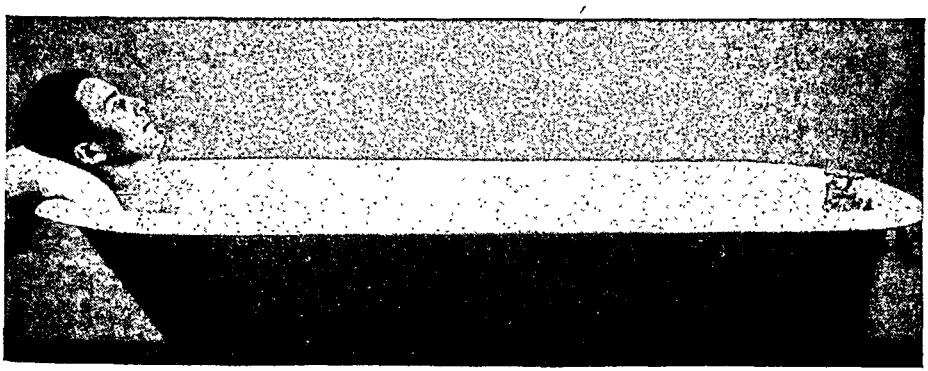
face, with the hands dipped frequently in the water. There should be vigorous friction with a coarse towel after the bath, then exercise until reaction is complete. Immediately upon arising is the best time for this bath, while the body is warm, or after a Turkish or Russian or other vigorous heating procedure.

This bath is not used very extensively at present, either as a hygienic or hydrotherapeutic procedure. It should not be employed by anyone who is not quite robust, nor by aged persons or children. But when properly employed it is a powerful agent for increasing vital resistance. It promotes appetite, improves digestion, aids circulation, and arouses the nervous system to a marked degree. It is of value in obesity when there is no disease of the heart. See also *Cold Baths in Health,* and *Plunge, Cold.*

Hot Full Baths.—These are immersion baths taken in water at a temperature above that of the body. The usual temperature will be from 98 to 104 degrees, sometimes very much hotter. The difference in effects produced with the different temperatures will be not in nature but in degree. Sometimes, when a very high bath temperature is desired, it is advisable to get into the water at a neutral temperature, or about 95 degrees, then add hot water until the temperature of the bath is raised to a degree varying from 102 to 105 degrees. The usual duration of the bath is from two to five minutes, though fifteen minutes is often not too long. Anything beyond this time is inadvisable, since there is likely to be a dangerous elevation of body temperature.

Hot Full Bath

The average person is inclined to use the hot full bath



The full bath, or immersion bath, is one in which the entire body except the head is under water. If it is a cold full bath, with temperature from 50 to 70 degrees, it should not last more than twenty seconds.

excessively and to physical detriment. If followed by some cold application the harm of frequent prolonged hot baths is lessened; but even this will not undo the harm such bathing does. Those who have specially good reasons for taking hot baths should make it a point to take cold baths immediately following, or at other times during the day, to invigorate the body and restore tone. For instance, a cold bath every morning will enable one to build vigor and hardihood, while three hot baths a week are sufficient to accomplish most purposes desired of them. In a case of this kind it would not be necessary to take the ordinary warm baths with soap once or twice a week, which otherwise are advised for the sake of cleanliness. These hot baths will accomplish this result as well.

Use of Hot Full Bath

When used as a health-building measure the hot full bath usually should be taken at night, when it will generally prove an excellent remedy for sleeplessness. Another reason for taking it at this time, however, is the advantage of allowing the body to remain for hours in its relaxed condition—an effect of the hot bath more pronounced than can be secured from most other measures. If such a bath is taken at night, it is often better to dispense with the cold bath immediately afterward. However, the morning most likely will find the bather languid and without energy. Unless the cold bath is taken then, it may be hours before the energies are awakened sufficiently for the individual to be "himself."

Hot water is almost always soothing and effective in relieving pain, though in some cases excessive heat aggravates pain. But one of the most marked and valued influences of the hot full bath lies in stimulating the activity of the pores of the skin. It is such a powerful eliminant that by its means the skin may be made to do much of the work of the kidneys, and for this reason the hot full bath has been found of great value in several forms of kidney trouble. However, since elimination of fluid from the body through the skin concentrates the irritating solid elements of the urine, it is important that those taking hot full baths for kidney affections drink plenty of water, even when there is a dropsical condition resulting from the kidney disease. Aged persons whose kidneys are defective but not diseased, and who have imperfect elimination otherwise, will find that regular hot bathing will do much to-

Hot Full Bath in Abnormal Conditions

ward keeping the blood free from impurities and in maintaining reasonably good health, if chilling is avoided after the baths. This is exceedingly important.

As hot baths are likely to be depressing unless used carefully, they should not, as a general rule, be taken without good reason, and should rarely exceed three a week. The invigorating cold bath is usually better. Yet the hot baths are very effective and very beneficial in many cases, and certainly have their place in hydrotherapy. In cases of catarrh which have proven extraordinarily stubborn, in skin eruptions, and in other common manifestations of waste accumulations in the body, hot baths will often effect results of an immediate and beneficial sort.

Caution in Hot Full Bath

The hot full bath is not recommended for very thin individuals or those having a defective heart or circulation. It is most useful to those who are above normal weight and in whom a slight loss of energy is immaterial. But even in such cases the bath usually should continue not longer than fifteen minutes, preferably less, though in an occasional instance it may be taken for as long as half an hour without real detriment. It has been said that one's instincts should guide largely as to the temperature and duration of a hot bath—that the bath will be beneficial so long as the sensation of immersion in the water, as hot as can be endured comfortably, is gratifying and pleasant.

On the other hand, one's feelings are very unreliable guides in this matter. Great lassitude, weakness and weariness are often felt when one emerges from a hot bath, or after drying is completed, although only pleasurable sensations were experienced during immersion. If they are felt during the bath it should, of course, be terminated at once. If they appear afterward the duration of future baths should be shortened, their temperature lowered, or both, while a finishing cold bath may also be needed. The majority of people repeat the hot bath as if it were the only possible bath to take, in spite of resulting languor.

It is very important to avoid becoming chilled after a hot bath. There is not so much danger of this as is popularly supposed, for the excess of warmth in the body will enable one to withstand a great deal of cooling. Yet serious chilling is

possible. But if one goes straight to bed and covers well, this is not likely to take place. Even the most meager cold application following the hot bath greatly reduces the tendency to chilling, but if one desires the maximum of relaxation and the possibility of immediate sleep it may be best in some cases not to use the cold water until morning.

Uses for Hot Full Bath

As a means of breaking up a cold the hot bath is excellent. It will answer the same purpose as a hot cabinet bath or any other means of inducing profuse perspiration, and it usually will be found more comfortable than the cabinet bath or blanket pack (the electric-cabinet bath being left out of consideration). It will serve quite well as a household substitute for a Turkish or Russian bath, and may have a great advantage over the latter in that one can provide in one's own home the ventilation which the public bath establishment does not offer. And as a means of taking the soreness and stiffness out of muscles after overexertion or unusual exertion or strain, there is nothing superior to the hot full bath.

Among other conditions in which the hot full bath is of great value are: bronchial pneumonia in children, in which disease the baths may be repeated two, three, or four times in twenty-four hours if necessary, the patient to be removed from the bath upon reddening of the skin; chronic bronchitis; cerebrospinal meningitis, if the head is protected with an ice-water turban frequently renewed; painful menstruation and suppressed menstruation; acute kidney disease; colic of gallstones and kidney stones; muscular rheumatism; intestinal colic. Other diseases in which the hot full bath is of service are catalepsy, convulsions, chills, eclampsia, hysteria, tetanus (lockjaw), hydrophobia, croup, cyanosis, the delirium of insanity, delirium tremens, the dropsy of pregnancy, drug mania, falling hair, influenza, the itch, migraine, psoriasis, ptomaine poisoning, urethral stricture, general toxemia, and dropsy of the knee-joint. Combined with the pouring bath to the head and spine and followed by wrapping in warm blankets the hot bath is excellent in the convulsions of infants and children, though children do not bear such high temperatures as may be used with adults. This bath must not be used, however, when there are destructive changes in the brain or spinal cord, heart or blood-vessels. In any type of case it is necessary that care be

taken to avoid chilling afterward. This is especially true when the kidneys are diseased.

Japanese Hot Bath.—The Japanese rate the hot bath as a national institution. With them it is a daily routine, taken at the close of the day after the labors of the family are over. Usually the tub is outdoors in front of the little cottage, and the water is heated on a stove indoors late in the afternoon. When the master of the house comes home from his work the tub out in front is filled with the hot water and he gets into it. It is so hot that he takes on the color of the proverbial boiled lobster, and he scrubs and scours himself, with the help of his diminutive wife, until he feels that he is clean. The procedure is gone through rapidly, lasting but a very few minutes. When he gets out of the tub, his wife takes his place, and after her the children in the order of their ages, until all are clean and red.

The Japanese Hot Bath

The weak point about the Japanese method is that all the members of the family, one after the other, use the same water, but this is a matter of economy with them. Regardless of this drawback the bath is effective, and, as it is a daily practice, none of them ever is very dirty, either externally or internally. Incidentally it may be stated that morally they are clean also! Fancy the average American being bathed by his or her marital partner in their front yard for all the world to see! See also *Health and Bathing.*

The Graduated Bath.—This is an immersion bath beginning with water at a temperature of from eight to ten degrees below that of the body, then lowered progressively to a degree of seventy-seven by one-minute reductions of two degrees, the duration of the entire bath usually being not over thirty minutes. It is one of the most effective of all hydriatric measures for reducing fever, since it can be perfectly controlled. Sometimes it is better to begin the bath at a temperature only three or four degrees below that of the body, thus avoiding the shock usual with the colder water. This should always be done when there is organic disease of the heart or arteries. The graduated bath is sometimes used as a tonic application in cases of fever; usually, however, some other procedure is better—such, for instance, as the cold wet-towel or cold wet-hand friction.

The Graduated Bath

The Neutral Bath.—This is an immersion bath, taking its name from the fact that it is neither hot nor cold, but warm —near (just below) the temperature of the body itself. While the average temperature used is 94 to 95 degrees, it may be from 92 to 97 degrees. The lower temperatures are to be used when the skin is flushed and the patient feels feverish, the higher ones for those who have little blood and body heat and are thin. The water should cover the whole body up to the chin. Friction should be avoided during and after the bath, since it neutralizes the desired sedative effects.

Temperature of Neutral Bath

The neutral full bath is of especial value for those whose occupations and professions demand great mental activity with very little muscular exercise. Insomnia due to excessive mental activity or high nervous tension, as well as that resulting from numerous other causes, is more quickly combatted by this bath than by almost any other measure. Many centuries ago Hippocrates recommended and prescribed it for insomnia. However, if it is to be effective for this purpose, much care must be taken to prevent chilling upon removal from the bath. The patient should be dried by gentle patting after being wrapped in a sheet and blankets. In some cases removal from the bath disturbs the patient and neutralizes its sleep-producing effect. In these cases it may be advisable to allow him to sleep in the bath, even for several hours, a watch being provided to see that his head remains above water. This should be necessary, however, only when the patient cannot sleep otherwise.

The usual duration of the neutral bath is from fifteen minutes to one or two hours. Whether used for insomnia or some other condition no harm will result even though it be continued daily for a long time, providing the morning cold or cool bath is used with equal regularity and the body is well nourished.

Duration and Uses of Neutral Bath

Other conditions favorably influenced by the neutral bath are degenerative and inflammatory conditions of the arteries, nerves and brain, such as arteriosclerosis, locomoter ataxia, apoplexy and multiple neuritis; also milder nervous affections, general dropsy, arthritis deformans, rheumatism, neurasthenia, and chronic disorders of the abdomen, when baths at very high or low temperatures cannot be taken and the neutral

Neutral Bath, Curative Value of

baths are given for only thirty minutes or less. Still other diseases in which the neutral bath has proved useful are fish-skin disease (ichthyosis), leprosy, leucorrhea, the delirium of acute meningitis, menstrual mania, neurasthenia, pellagra, purpura, tuberculosis, acute alcoholism and asthma. Fevers respond also to the neutral bath, and it is especially valuable for aged people, infants, young children, and debilitated individuals.

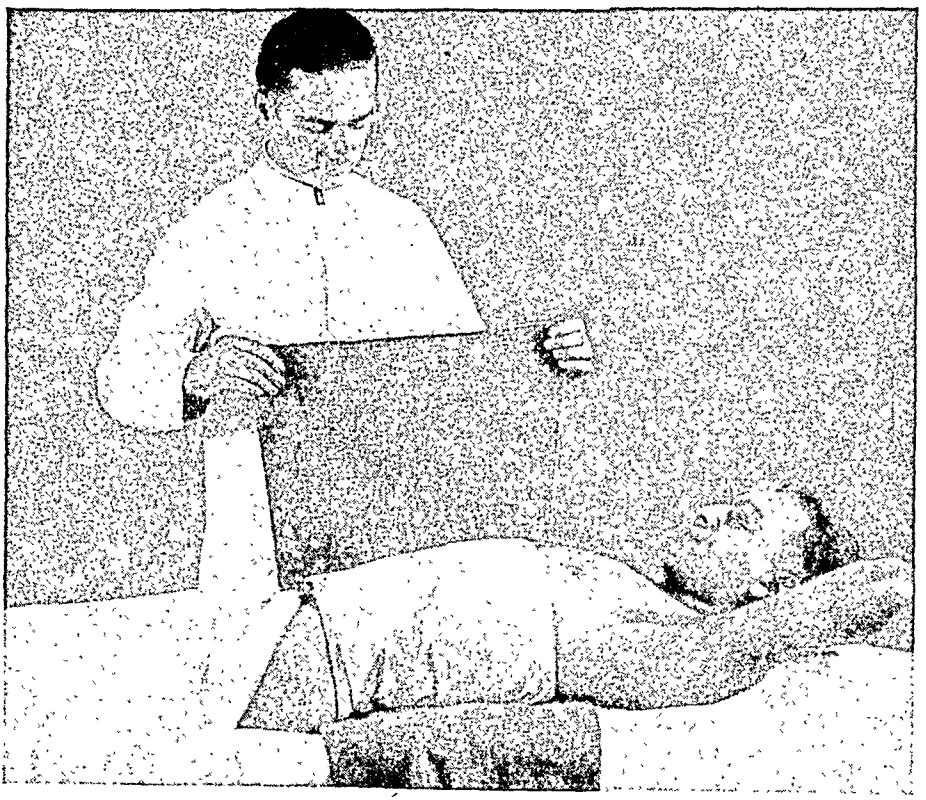
The few conditions in which this bath is not advisable are skin diseases in which other water treatments also are inadvisable, and some cases of neurasthenia.

The Continuous Bath, a measure developed from the neutral bath, is discussed in this section.

GARGLE.—See *Irrigation of the Throat,* under *Irrigations.*

"Neptune's Girdle"

GIRDLE OR ABDOMINAL PACK.—This application has been very popular in Germany for more than a century, the name



In the abdominal pack the best results will usually be secured by having only a single thickness of flannel over the compress, but when the skin is cold there should be more flannel.

used for it there being "Neptune's Girdle." It is simply a wet pack bounded above by the nipple line and below by the hip joints. Sometimes a *trunk pack* is used, which is the same, but reaching from the armpits to the hips.

The Girdle Pack in the Making

For the girdle are required a bandage of linen or old sheeting 8 or 9 inches wide and long enough to encircle the body three times; a flannel bandage 3 or 4 inches wider, of the same length; and mackintosh, rubber sheeting, oiled silk or other impervious material still wider and long enough to overlap after encircling the body over the pack. This last material is often omitted when evaporation is desired; when it is used the application is termed the *protected girdle* or *protected abdominal pack.*

Girdle Pack, Application of

In applying, the linen cloth is wrung from water at the desired temperature (usually cold, but sometimes hot) and fitted snugly but not tightly about the trunk. The flannel is then applied, care being taken completely to cover the wet pack beneath. Then if the impervious material is used, this is applied in such a way as to exclude air from underneath, since contact of air with the body beneath the pack will nullify its effect; in fact, it will have an opposite or undesired effect. When the girdle becomes dry from evaporation, it should be renewed, or the parts covered should be rubbed with the hand wet in cold water, after which a dry flannel girdle should be put on.

The best time for this application is upon retiring, though in cases of prolapse of the abdominal organs, with pain in the back and abdomen, it is beneficial when worn during the day. The cloth used should be boiled thoroughly, or rinsed in some antiseptic solution, every day to remove perspiration and other eliminated substances. Otherwise eruptions may develop on the skin covered by the pack. It is rarely advisable to wear the pack both day and night, but when it is necessary there should be an occasional day in which it is omitted entirely. On these days, say once a week, a dry flannel bandage should be worn.

Girdle Pack, Uses of

The girdle is a very valuable hydriatric application, of benefit particularly in chronic abdominal and pelvic disorders, perhaps particularly chronic digestive troubles. If the upper abdominal organs are affected, the pack may be placed about

the upper abdomen, while, if the pelvic or lower abdominal structures are affected, the lower abdomen may be covered. In either case the trunk pack may be used—the entire abdomen being covered.

A very good use of the girdle is for the relief of insomnia. It is better to use very cold water, and the protecting impervious material may or may not be used, providing reaction takes place promptly. Remember that it is not the cold application that benefits, but the moist heat, which draws the blood to the abdomen, thus relieving brain congestion. In pregnancy the girdle may be used with benefit during the later months or even throughout the entire period, especially if there are abnormalities of abdominal or pelvic organs or of the functions of the abdominal organs. This also is a very useful application in cases of dropsy of pregnancy, in sleep-walking, smallpox, Addison's disease, alcoholism, cholera infantum on the second day, acute enteritis (later in the disease), gastritis, hematuria, some forms of influenza, mumps if fever is present, bubonic plague, typhoid fever, displaced abdominal organs, abdominal pain with fever, congestion of the brain. The hot abdominal pack is useful in cholera morbus, cholera infantum (first day), delirium tremens, diarrhea, enteritis with pain, gangrene, hectic fever, hemophilia, acute indigestion, insanity, jaundice, leucemia, liver diseases, lumbago, dropsy of lungs; in severe cases of acute meningitis, extravasation of urine, vomiting, and asthma.

Uses of Girdle Pack

It is inadvisable to use the impervious material when there are tumors of the uterus with bleeding, or in cases of hemorrhoids, gastric ulcer, or acute inflammations of the abdominal or pelvic organs. But the girdle unprotected is very beneficial in these conditions.

GRADUATED BATH.—See under *Full Bath.*

HALF-BATH.—The half-bath, as its name implies, is a bath with water at less depth than the full bath. However, it is practically a full bath, since the entire body is bathed. In the half-bath the water reaches the umbilicus while the bather is seated in the tub. It is much like the sitz-bath with the legs extended, and sometimes is called the *sitting bath.* It is really a modification of the shallow bath, but differs from it in that it is of longer duration, there is no rubbing unless the tem-

Procedure in Half-bath

perature of the bath is quite low, and the temperature usually is above cold—hot, neutral or cool. For further discussion see *Shallow Bath.*

HALF-PACK.—This may be called a half wet-sheet pack, since it is exactly the same as the wet-sheet pack except that only the trunk and hips are treated. Sometimes the trunk only is included, when the pack is called a *trunk pack* (See *Girdle or Abdominal Pack*). The same materials and temperatures are used for the half-pack as for the wet-sheet pack, only the wet sheet is abbreviated. It is used for the same conditions as the wet-sheet pack, as it has the same effects. and often it is used in preference to the latter, largely because it is more convenient to the patient and the one making the application. Sleeplessness, nervous indigestion and nervous affections of the abdominal organs are the chief indications for its use. See *Wet-Sheet Pack.*

Indications for Half-pack

HEALTH AND BATHING.—When one finds the practice of bathing one of the greatest comforts and joys of life, then one may be quite sure that it is just as beneficial as it is pleasurable. The question of whether it is harmful or healthful may be decided, by most people, by this test of its pleasure-giving effects. Here, as in many other matters, we should be able to trust largely to our instincts—and it is instinctive to enjoy contact with water.

Bathing for Pleasure

We are not especially concerned here with the history of bathing. At the beginning of this section it was stated that bathing is as old as the human race, or so we have good reason for believing. It has been invariably associated with the more civilized, progressive, and powerful nations of the world, though it has also been practiced by most races of savages in one way or another, chiefly in the natural form of swimming. We know that bathing was given a prominent place in the lives of the ancients. Athens, Carthage, Corinth, Memphis, Agrigentum, and all the seaport cities of Western Asia maintained free public baths, while Rome was particularly lavish in the provision of luxurious bathing facilities. There can be no question that through heredity their fondness for bathing is a very great factor in promoting the health and vigor of all the robust nations of the present era.

Bathing is of value as a health-building agency in two dif-

ferent ways: as a means of cleanliness, and as a tonic. The old saying "Cleanliness is next to godliness" has long been something of a commonplace. But, nevertheless, it is significant of the great truth that external cleanliness, aside from its value for its own sake—its esthetic value—has a very great deal to do with the purity of the blood and general internal wholesomeness. These effects cannot but react favorably upon mental and normal wholesomeness. During the Dark Ages, the "thousand years without a bath," the general health of the people was pitiably below normal. Not only was there frightful mortality from pestilences of various kinds, but superstition and ignorance were rampant and engendered the habit of uncleanliness.

Bathing and Health

As we have already learned from our study of the skin, one of the functions of this covering is that of helping to eliminate the wastes of the body through millions of tiny pores. If these pores are active in their work, so much the better for us. If they are interfered with in these labors, so much the worse; for, as a result of such interference, the impurities of the body will accumulate until they cause disease in one form or other. Without a proper amount of bathing they are likely to become clogged with grease, dirt, and other substances excreted by the pores themselves, or collected from external sources.

In a state of nature and nudity there may be no special need of bathing for the sake of cleanliness, because this purpose will be well enough provided for by the exposure to the air and the occasional friction to which the skin is subjected. The so-called "scarf skin" consists of innumerable tiny epithelial cells, in the form of diminutive scales, constantly forming and pushing to the surface from where, in a deadened and dried condition, they are rubbed off. At least they are so rubbed off and forced off under natural conditions, that a reasonably clean and good condition of the skin is continuously provided. Theoretically this should be sufficient for cleanliness, though actually it is quite likely that water bathing, if only in the form of swimming, would be necessary to maintain the highest degree of skin cleanliness and skin health. As a matter of fact the savage often bathes for the mere exhilaration of it, although he does not give a thought to the health

The Skin in Nature

of any part of his body. In the use of clothing we have so seriously impeded the process of self-cleansing of the skin that bathing becomes an actual necessity from the standpoint of cleanliness, and therefore from the standpoint of health.

Bathing, Amount of

The amount of bathing necessary for the purpose of cleanliness will vary according to the individual, his diet, his occupation, and his habits. If his diet is favorable to a perfectly healthy condition of the blood and if his other eliminative functions are normal, then there will be no excessive amount of waste to be eliminated through the skin. On the other hand, if one is a heavy consumer of meats, if one is negligent in the matter of exercise, if one's organs and particularly one's other depurating organs are sluggish, then it will be the more important to keep the skin clean so that as much as possible may be eliminated through it. See *Friction Baths, Dry.* Again, if one's occupation is such as to expose one to dust, soot, oils and greases, etc., the best possible diet, the most perfect functioning and cleanliness of the internal body, and the most faultless natural skin activity and self-cleansing will not keep the skin clean. Water cleansing will be necessary.

Exercise has a very important influence upon the internal condition of the body and also upon the amount of perspiration. In the section treating of exercise its influence in cleansing all the tissues of the body is pointed out. But here the importance, indeed the necessity, of bringing about a certain amount of perspiration daily as a means of preserving health is to be emphasized, it being assumed that this perspiration is the natural result of physical activity. Though hard and fast rules should be given to others with caution, it may be set down as a general rule that, unless one's habits are so arranged as to insure a certain amount of increase in perspiration each day above the usual insensible perspiration, one cannot maintain a perfectly pure and wholesome condition of the inner body. It is the old story of "the sweat of thy brow" —applied to health rather than nutriment.

Influences Governing Need for Bathing

If the pores of the skin are not thus increased in activity, either the kidneys must be overworked to remove what the skin has failed to remove, or the uneliminated wastes must accumulate in the body, ultimately to cause disease. If active elimination of these wastes is prevented for a sufficient length

of time, because of reduced vitality, or because the quantity is so large that the eliminative powers are overwhelmed, or as a result of weakness of the eliminating organs, they may produce organic or structural changes, or the curative processes of the body may seek to eliminate them. This latter involves the loss of more or less vitality and probably very marked discomfort and inconvenience to the individual. It is far better to maintain perfect functioning of all organs and to have all wastes eliminated day by day as fast as they are formed, thus avoiding the necessity for these beneficent though often painful crises which accomplish the work spasmodically—and usually a little short of completely.

Few can spend several hours a day in wholesome exercise while dressed in scant apparel, say the conventional "running suit;" but when this can be done there is such free contact of the air with the skin that to a great extent the increased body wastes that are carried out through the pores will be taken up by the air through evaporation. The "clinkers" or solid substances in the perspiration, which are left behind after evaporation of the moisture, remain to be removed by some other means—friction or water bathing. Exercise aids the pores in bringing to the surface of the body increased amounts of these solid wastes; but the work of the pores ends here—they cannot remove these wastes from their own surface. If one exercises in conventional dress or even in heavy, close-fitting underwear, the need for surface cleansing is still more urgent. See *Warm Bath.*

Bathing and Exercise

The more imperfect one's health and the more corrupt and impure the condition of the blood, the more important is some form of bathing for insuring that external cleanliness that permits the pores to function normally, or as near normally as possible. But aside from this aspect of the matter, certain baths, chiefly cold baths, are invaluable for building health and vigor. Cold water has not only a very remarkable effect upon the circulation of the blood, but it has a particularly good effect upon the nervous system as well, through its contact with the myriad of nerve end-organs located in the skin. Those who suffer from nervous weakness or nervous disorders can often secure results through the use of cold or cool water that they can bring about in no other way. Cold water has

a very excellent effect upon the muscular system, the vital organs, and the blood-making organs, thus invigorating and toning up all functional processes. See *Cold Baths in Health.*

Bathing in the Schools

Eventually, perhaps in the comparatively near future, every school will have its gymnasium for health-preserving and health-promoting exercise; and in connection with these, gymnasiums will have hot and cold shower baths and a swimming tank. The introduction of these facilities into our schools we have long advocated as a hygienic necessity; and if the race is to progress instead of deteriorate it is essential that they should be made available to the rising generation, and that speedily. It is firmly believed that if our children could have a cold bath every day, either at home or at school, it would require but one generation to produce such a marked improvement in the national health as to pay a tremendous profit on the investment involved.

HIGH ENEMA.—See under *Enema.*

HOT-AIR CABINET BATH.—The hot-air cabinet is a device for supplying in one's own home the advantages of a Turkish bath, including copious perspiration. The medium used is dry hot air. The cabinet is large enough for one to sit in, but with the head outside so that one may breathe pure, non-heated air.

Hot-air Cabinet Bath

Cabinets for these baths are made in different forms and of different materials, some of which are quite inexpensive, but many people construct their own cabinets. The air is heated by means of hot pipes, kerosene, or gas stoves, alcohol lamps or otherwise. The temperature may vary from 120 to 200 or more degrees, but somewhere between these limits will usually be sufficient. The highest endurable temperature should not, however, be employed at the beginning. It is better to increase the heat as the body adjusts itself to it. This is easily done by getting into the cabinet when the heat is started, or shortly afterward.

The patient, of course, is undressed while in the cabinet. Best results will be secured if he drinks a glass or two of normally cold water before entering the bath and another one or two during its progress. Some people drink hot water at these times, but this is not necessary; cold water is better because it is tonic, and perspiration comes from the effect of

the hot air rather than from internal heat. If the feet are in a small tub of hot water, still more prompt and vigorous perspiration will be established. It is well for the patient who is subject to cerebral congestion to have a cold wet turban about the head and a cold wet cloth about the neck while in this bath; otherwise wetting the head, face, and neck with cold water before entering will be sufficient. The bath usually is continued until the entire body is bathed in copious perspiration.

Upon leaving the bath a warm or hot spray, douche, sponge, or pour should be administered. Then the temperature should be gradually but rather rapidly reduced to not less than 75 degrees, and this temperature applied for from one-half to one minute, or until the body feels comfortable and the pulse becomes quiet. When it is necessary to continue the sweating effect of this bath, the patient may be wrapped in warm blankets for half an hour or so after emerging from the cabinet, the perspiration being encouraged further by drinking half a glass of water every five minutes. In this case the patient usually remains in the bath less than half an hour.

Hot-air Baths for Perspiration

This bath is almost always used in connection with other baths. Its chief purpose is to produce perspiration and stimulate the skin more or less temporarily. The sweating process alone cannot purify the blood and keep it pure. It is good only so far as it goes. The muscular system must be strengthened and the nerves toned up and various other influences must be at work before all eliminative processes and the multitude of other functions of the body can be restored to normality. Hence the terminating bath and usually some other measures.

Care must be taken in using the hot-air bath to avoid an excessively high temperature or undue prolongation. Overexposure causes throbbing headache, great thirst, nausea, and dizziness, sometimes fainting. Moderate quickening of the pulse and of respiration need cause no concern, for these effects are usual and natural. When water at too low a temperature is used after the bath, or when it is applied with too much force (as by a strong douche), such sudden and extreme contraction of the cerebral vessels sometimes results as to cause fainting. When this happens the graduated bath should be used for the final application in later treatments. It should

Hot-air Baths, Duration of

be borne in mind that any sweating procedure tends to drain the body of fluid, thus lessening moisture in the intestines and hence producing, or tending to produce constipation. To overcome this the patient should drink fairly copiously of cold water.

Hot-air Bath, Best Time for

A cabinet bath, like any other hot bath, should usually be taken before retiring. But if the body is not allowed to cool off too quickly after such a bath, it may, when it seems necessary, be taken at practically any time of the day.

For those who are overweight, the hot-air bath is of service, though it must be understood it does not replace vigorous daily exercise in the open air, either as a means of purifying the blood, of introducing perspiration through increased deep-seated cell activity, or of reducing flesh. For absolute internal cleanliness, diet only is superior to exercise and outdoor life, and sweating baths and other such measures are only substitutes at best. Yet there are occasions, when one is over-fatigued and incapable of taking much vigorous exercise, when a thorough sweat is one of the things the body needs. Under such circumstances a cabinet bath is of great value, though a hot full bath will answer very much the same purpose.

Hot-air Bath, Uses of

Among the conditions in which the hot-air bath may be of excellent service are the initial stages of a cold, rheumatism, sciatica, lumbago, and erysipelas. But it must not be used in fevers, heart dilatation or weakness, hardened arteries, diabetes when the patient is very thin, and late or severe cases of kidney disease.

The Non-cabinet Hot-air Bath

If one does not have the apparatus for a hot-air cabinet bath, it is a very simple matter to improvise a substitute to answer the purpose. This may be done by using a foot-bath tub, immersing the feet and ankles in quite hot water and wrapping the rest of the body well with warm blankets. This will soon bring out the perspiration. The effect is hastened and intensified by the drinking of either hot or cold water or hot lemonade, preferably unsweetened.

If an electric or other form of cabinet with doors is too expensive, a suitable device may be constructed at little expense with the help of a tinsmith, by using a sheet of zinc to form a cylindrical cabinet of, say, 4 feet diameter and high enough to come to the neck while the occupant is sitting. One

free margin contains a groove into which the other end fits. Thus the sheet can be rolled up so that it will occupy very little space when not in use. The metal furnishes the side walls. The top may be provided by rubber sheeting, oilcloth, canvas, blanket or other tightly knitted or woven fabric, with an opening near the back through which the head may project and just large enough for that purpose. This opening may be made to fit more closely by means of a towel wrapped snugly about the neck of the patient. Illustrations and description of the method of making such a cabinet appear on pages 2333 and 2334, this volume.

The Cabinet for the Hot-air Bath

The heat may be provided by a kerosene or alcohol lamp or stove beneath a cane-bottomed or perforated bottomed chair, with some means adopted as a protection against burning the patient or his covering. If the bath is to be given in bed an asbestos-covered or otherwise protected pipe leading beneath the bedclothing may direct the hot air from a lamp or stove.

HOT-AIR LOCAL BATH.—This is the application of superheated air to some local area of the body. Temperatures much higher than can be borne in the general hot-air bath are possible when a circumscribed area is treated, from 300 to 400 degrees often being used, with comfort to the patient. These temperatures are entirely out of the range of possibility when moist air or vapor or water is used, since the boiling temperature is only slightly above two hundred degrees (212 degrees). By means of a properly constructed box or other device and a pipe leading into the box from some heating appliance almost any home can have its cabinet for local hot-air baths to the arm or leg or joints. General perspiration usually develops when the local treatment is continued for some time, for which reason the patient should be undressed but well covered for such treatment, and some cold application should be given afterward, with sufficient friction, drying, and rubbing to insure prompt and complete reaction. But if there is no general perspiration, the local part may be well wrapped with wool and impervious material, for continuation of the effect of the bath.

Description of Hot-air Local Bath

The conditions in which this treatment is of the greatest value are chronic joint inflammations and rheumatism of the joints, and the longer these conditions have continued the

Local Hot-air Baths for Rheumatism

longer, as a rule, should be the application of heat. In acute cases the treatment should not be used.

HOT-WATER BAGS.—Hot-water bags are usually made of rubber and are of different sizes with a metal cap for retaining the water. These bags are sometimes called hot-water bottles, but usually by the latter term is meant merely large bottles which may be filled with hot water, stoppered, and used to supply additional warmth to a patient. Earthenware jugs also may be used in the same manner. These are satisfactory, but one must take care lest they fall to the floor and break, or break from the excessive heat of the water, or lose their cork stoppers and flood the bed. A form of hot-water bottle now in common use is made of metal. It is about the size of the ordinary rubber bag, but it is made with a convex and a concave side to conform to the curves of the body. This bottle retains heat longer than a rubber bag and at the same time is light but very strong.

Types of Hot-water Bags

Some hot-water bags are made with a sort of felt outer covering so as to temper the heat and prevent scalding of the skin. Knitted worsted holders are also made into which the hot-water bag can be slipped. The holder is fastened about the neck of the hot-water bottle.

Hot-water bags are useful in much the same way as fomentations, and often may be used in connection with the latter, or, rather, with hot compresses. Used alone, the hot-water bag gives dry heat, which in local affections is usually not so effective as moist heat. Hence fomentations are usually of greater service than hot-water bags or bottles alone. When the hot-water bag is placed over a wet cloth the application becomes in effect a fomentation, if the bag is hot enough to make the cloth very hot; otherwise it becomes a hot compress. Hot-water bags are of value in relieving inflammation, reducing pain, producing relaxation, and increasing circulation in local areas. The bags or bottles are excellent to keep at the feet or along the sides when the vitality is low and during fasts in cold weather, also to supply heat when the blanket pack and some other procedures are employed. Care should always be taken to see that they are not too hot, especially when there is reduced nervous sensibility or paralysis, as severe burns may thus be produced and serious open sores

Uses for Hot-water Bags

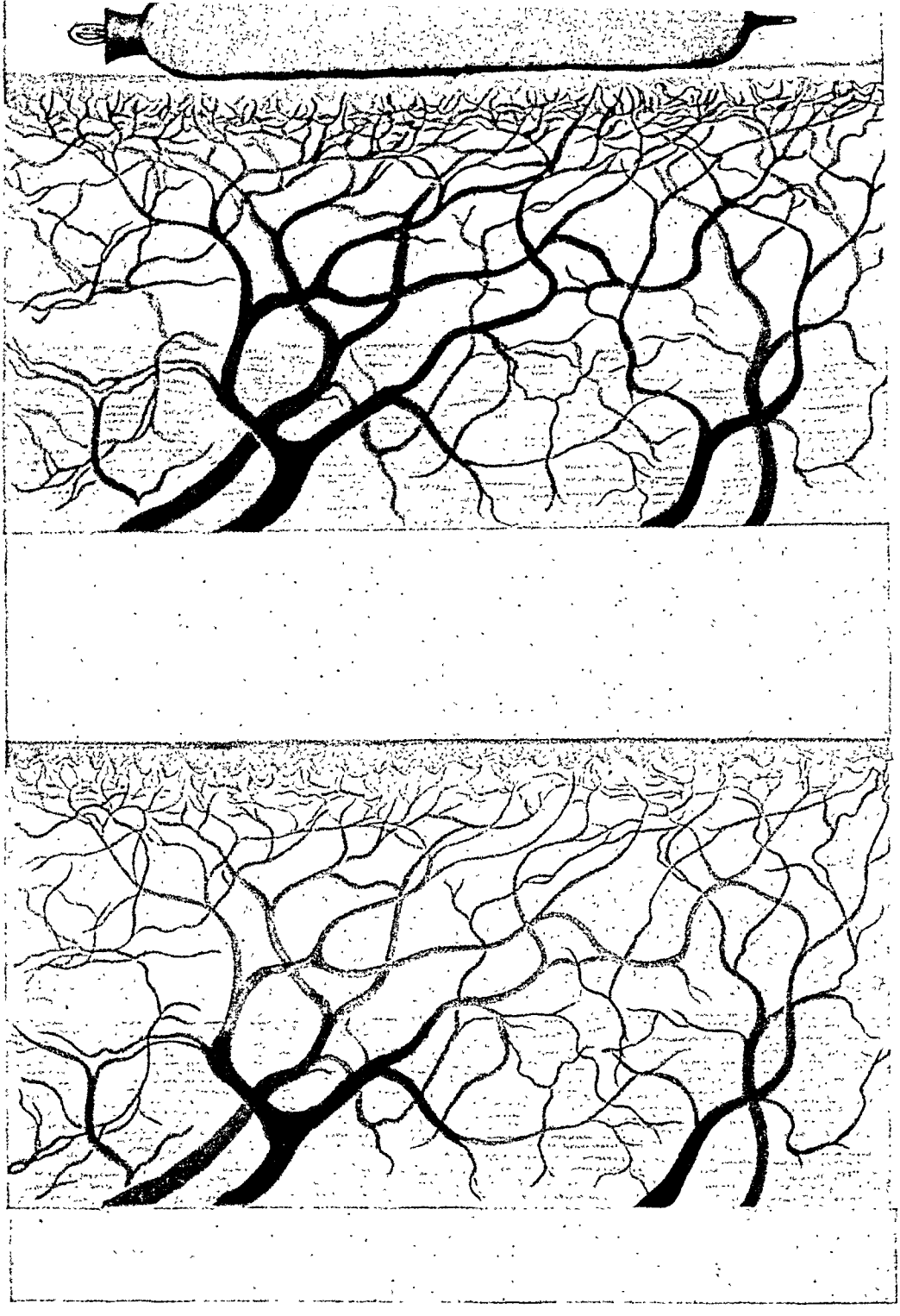


PLATE 71. The arteries, capillaries and veins of the skin and the structures beneath it, rapidly fill with blood upon the application of the hot-water bag, as shown in upper illustration.

As an immediate reaction after the removal of the hot-water bag, the blood rapidly leaves the surface arteries, capillaries and the veins, as shown in the lower illustration.

follow. In general it may be said that the remarks in regard to the application of *Fomentations* will apply here.

Siphon Hot-Water Bag.—See in alphabetical position.

Hygienic Value of Bathing.—See *Health and Bathing.*

Ice.—The use of ice for the relief of various symptoms and abnormal conditions has been recommended by physicians for many years. Intense prolonged applications of cold are sedative through their effect of greatly lowering the activity of the nerve centers governing the nerves reached by the local cold. In this way the cold also has a very marked effect upon the blood supply of a part. One disadvantage in the use of ice is that, while it may have a desirable effect upon a certain symptom or condition, it may be producing at the same time an undesirable effect elsewhere.

Ice, Therapeutic Uses

Most people know of the effect of extreme cold, as by ice, in stopping nose-bleed when applied to the base of the skull or to the root of the nose. One of these procedures, especially the former, or holding the hands in ice-water, may prove effective when practically all other measures have failed. There are, however, extremely few indications for the use of such intense cold as that produced by ice itself directly in contact with the skin, or with nothing between the ice and the skin but a thin layer of rubber, as in the case of the ice-bag. If an acute condition is of such severity as to require such an extreme procedure as the application of ice for longer than a few seconds, the case should be under the supervision of a qualified physician versed in the use of such a measure. Prolonged cold applications should not be made indiscriminately.

Ice-Bag.—The ice-bag is merely a special rubber bag with a large mouth on one side or on top, closed with a metal screw cap. Chipped or shaved ice should be used, as large pieces may be irritating to the skin because of prominent corners and edges; they also keep the bag from lying in close contact with the skin. Some of the conditions in which this appliance has been and may be used with benefit follow.

In cerebral anemia, with anemic headache, relief may be secured by applying the ice-bag to the upper neck for from one to three minutes. When reaction sets in, there will be a pronounced increase in circulation to the brain. The opposite cerebral condition, congestion, with headache, may likewise

Reaction to Use of Ice-bag

be relieved by the ice-bag, it being applied in this case to the head while at the same time very cold compresses are applied to the face and about the neck. The ice-collar may be used about the neck instead of a cold compress. In apoplexy the prolonged application of the ice-bag is of value. When the ice-bag is applied to the upper spine and a cold compress to the face much relief will be secured in cases of nasal catarrh. As an exception to the general rule for short applications, prolonged application to the back of the head, using care not to let the cold application come in contact with the chest, will relieve nervous asthma.

For a very rapid heart-beat the ice-bag may be used at the back of the head or the neck for ten to twenty minutes while at the same time a cold compress is applied over the lower chest region. When applied for one-half hour twice a day over the heart, the ice-bag is beneficial in palpitation, irritability of the heart, and valvular insufficiency. The ice-bag or ice-compress over the heart reduces the temperature in case of fever, and energizes the heart itself; but the applications must be removed for five minutes every twenty to thirty minutes or for one or two minutes every fifteen or twenty minutes while heat is applied over the heart or while the skin of this region is rubbed.

Effects of Use of Ice-bag

The ice-bag over the stomach for one-half hour before meals is excellent in case of anorexia or loss of appetite and in atonic dyspepsia or deficiency of gastric juices. The same measure is valuable also in case of vomiting or pain from gastric cancer or ulcer. Vomiting may be controlled, also, by applying the bag to the lower dorsal spine. When a fomentation is applied to the dorsal spine, an ice-bag over the pit of the stomach will relieve gastritis. When applied to the upper dorsal spine the ice-bag is of service in hemorrhage from the lungs, aiding in checking the loss of blood. Hysteria is often relieved, and hysterical outbreaks quieted, by applying ice-bags to the entire spine, or sometimes only to the cervical region and head. Abnormal irritability of the genito-urinary system is relieved by ice-bags to the lower dorsal and upper lumbar spine. Applications of the bag to the spine also lower the temperature in fever. The same treatment is helpful in some cases of typhoid fever, with incoordination of movement.

When applied to the back of the head, spermatorrhea and frequent seminal losses may be relieved. The applications should be made at night and continued during sleep. When applied to the upper cervical region for twenty minutes several times a day vaginal spasms and masturbation in women resulting from abnormal irritation may be alleviated. In orchitis the inflammation and pain may be diminished by short but frequently repeated application of the ice-bag to the testicle, which should be constantly supported. Coldness of the external genitals, with or without general atony of the parts, infantile uterus, and amenorrhea may be benefited by application of the ice-bag to the lower dorsal and lumbar spine. In amenorrhea, the hot vaginal irrigation (110 degrees) should be used for ten to twelve minutes, then the temperate irrigation (80 degrees) for a minute, two or three times a day. An acutely inflamed ovary or tube may be benefited by applying an ice-bag over the part while a very hot bath is given the feet. Locally applied, or to the lower spine, the ice-bag is of great service in case of inflamed and prolapsed hemorrhoids and in the pain of cancer and ulcer of the rectum. Additional conditions benefited by the application of ice-bags are headache, acute heart conditions, infantile paralysis (when applied to the spine), general inflammations, in some forms of acute mania, locally in mumps (short applications), in acute appendicitis before the formation of pus, and applied to the base of the brain in some cases of asthma.

The Ice-bag for Inflammation

When immediately following very hot applications (fifteen minutes every two or three hours) the ice-bag used for an hour or more (or the very cold compress throughout the intervals) will aid greatly in bringing about normal conditions in case of sprains and bruises. When there is inflammation in the distal part of an extremity, the ice-bag applied further up the extremity over the trunk of an artery will prevent further congestion and throbbing and pain. It may be used locally, also, for the relief of inflammation, but must be of short duration, frequently repeated. If removed as soon as possible, the ice-bag is of value as a means of checking bleeding in the case of a severe wound. However, this use is not to be recommended for frequent application, as blood is necessary for health and repair of the part. Cold lower extremities

Ice-bag, Application of

may be warmed by applying the ice-bag to the lower spine.

In applying the ice-bag it is much better and safer to use a well-saturated flannel (one layer) between the skin and the bag. If the application is to be prolonged the bag must be removed for a few minutes every half-hour or so in order to prevent too great reduction of vitality or response in the parts. During the time the ice-bag is removed, the parts may be rubbed with the warm hand or with a warm flannel, or fomentations may be applied for from one to four minutes. One of these procedures for restoring some of the local circulation is extremely important if there be no intervening material between the ice-bag and the skin.

ICE-CAP, ICE-COMPRESS AND ICE-COLLAR.—The ice-cap is merely a special ice-bag made to fit the head. The ice-compress is made of folds of flannel (though linen may be used) between the folds of which shaved or finely chipped ice is placed. The ice-collar may be a special rubber collar made to hold chipped ice or a special narrow ice-compress. What has been said above under *Ice-Bag* regarding applications of ice in this manner applies equally to these other methods. The choice rests largely upon the material at hand and the convenience of the application.

The Ice-cap

ICE-RUB.—The ice rub is performed by taking a piece of ice in the hand and passing it over the bare skin much as one applies the mitten friction bath. If a piece of ice small enough to fit in the hand is employed the warmth of the fingers somewhat reduces the intense cold, but since the application is to be made rapidly and only when the skin is fully warm, the sensation of cold is by no means as intense as one might imagine. Only when reaction is known to be vigorous should the ice-rub be employed. The best use for it is during local applications of sunlight or artificial sunlight, or general hot-air, steam, or electric light baths. If a heating application is being made, the ice may be used at ten minute intervals, or only toward the end of the heating application, which should continue for a few moments after the ice-rub, preparatory to the general tonic cooling bath to follow.

The Ice-rub

ICE-WATER.—Instead of any of the ice applications mentioned, ice-water may be used, especially when reaction is less vigorous. Compresses in which ice-water is used may follow

Ice-water

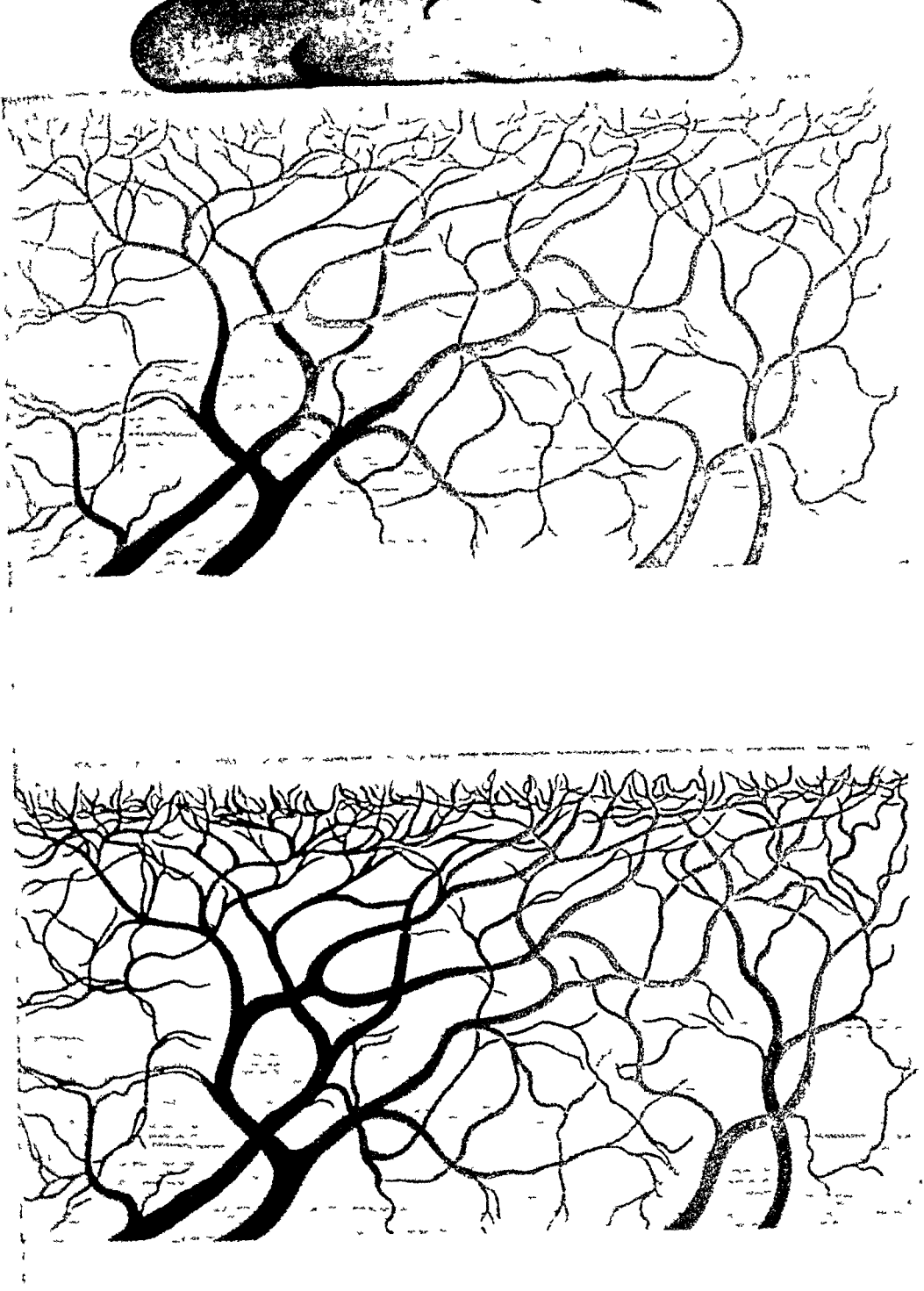


PLATE 72. The arteries, capillaries and veins of the skin in the upper illustration, show anemia (decrease in blood-content) produced in the skin by application of ice-bag. The blood rapidly fills the arteries, capillaries and in turn the veins, as shown in the lower illustration, as an immediate reaction after the removal of the ice-bag.

fomentations in many instances with more pronounced reaction and value. Regarding drinking ice-water see *Cold Water Drinking* under *Drinking Water.*

IMMERSION BATH.—See *Full Baths or Immersion Baths.*

IRRIGATIONS.—An irrigation is the washing out of a cavity with a stream of fluid. All cavities of the body may be irrigated, but some of them must be left to the specialist or to some other fully qualified person. Among the cavities which it is inadvisable for the patient to irrigate himself are the bladder, the urethra, and the uterus. The stomach may be self-irrigated, but the procedure is not convenient. (See *Lavage.*) The irrigation of the colon has been discussed under *Enema.* Irrigation of Cavities

Ear Irrigation cannot be completely applied by the patient, though some member of the family may give it when advisable. Only slight pressure is necessary in these irrigations, and extreme care must be taken to avoid such force as would injure the drum. A special appliance is made for such treatments, but the bulb for baby's enema may be used. In giving the irrigations the head should be leaned to the side affected. Quite hot water is used in the ear, cold rarely. The hot irrigations afford great relief in cases of earache from numerous causes, as well as serving to cleanse and disinfect the ear when there is a chronic suppurative condition. But the water should not be so hot as to cause pain. Too hot water may also cause maceration of the lining of the exterior auditory canal producing irritation and possibly a resulting eczema. After irrigation the ear should be gently but thoroughly dried, then covered with gauze or clean cloth. In cold weather, one should remain indoors for two or three hours after a hot or warm ear irrigation. Irrigations of the ear are excellent for removing accumulated ear-wax, it being best to soften the wax first with a drop or two of warm olive or sweet oil. Ear Irrigations

Eye Irrigations are often self-administered, but extreme care must be taken to have a suitable fluid at proper temperature, and to employ only slight pressure. Any suitable reservoir having a small rubber tube may be employed. This should be placed only five or six inches above the head so that the pressure will be slight. The water is allowed to flow not directly into the eye, but upon the forehead above the eye- Eye Irrigations

brows and upon the outer surfaces of the closed eyelids. Cold rarely is used upon the eyes. Even in inflammations, whether acute or chronic, the hot irrigation or douche is of greater value. Plain boiled water or boiled water containing a small amount of salt or boric acid may be used in practically all cases.

Instead of the irrigation, the *eye-cup* may be used. This is a small cup with specially curved margin designed to fit about the eye so that the head may be held backward and the solution in the eye-cup may come in direct contact with the eye without loss. This cup permits opening of the eyelids for direct treatment of the mucous membrane of the eye. This treatment, however, should be used with great caution unless under the supervision of a physician. Compresses and the irrigation usually will do all that can be done by means of the eye-cup, except in an occasional case where some medicinal application is considered advisable.

Eye-cup, Use of

Nasal Irrigation.—Irrigation of the nose is often performed at home, by means of an ordinary fountain syringe, with a special tip for the purpose, or with merely a small rubber tip. Sometimes a small cup specially designed for the purpose, with a fairly long and narrow spout, is used. Another very excellent apparatus for the purpose is a fountain syringe with a bulb-like end to the rubber tubing for one nostril, and a second free rubber tube with a similar bulb-like end for the other nostril. With the syringe bag properly suspended and filled with water or suitable solution, the two tips are inserted one into each nostril, the unattached tube being allowed to hang downward to drain into a basin or toilet bowl. After the water flows a while the attached tube may be pinched a little below the nostril, thus in effect closing that nostril. When this is done the palate also is to be closed so that no air enters the oral or post-nasal chamber. As a result of this procedure the water in the unattached tube remains in that tube, but exerts a downward pull, creating something of a vacuum in the upper nasal passages. This is beneficial when there is catarrhal or other inflammation, or blocking of the frontal sinuses as well as of the nasal passages themselves.

Apparatus for Nasal Irrigation

Without doubt the nasal irrigation or nasal douche is of comparatively slight importance, and has been used with detri-

ment in many cases. Formerly it was employed very frequently in the treatment of nasal catarrh, but often with resulting affection of the ear. Better ways of clearing the nose are by means of vaporizers or atomizers, or by some of the volatile oils. However, in some instances one may use the irrigation. Plain water in the nose, by either or any method, is irritating; but mild table salt solutions or solution of bicarbonate of soda are soothing and cleansing. When the irrigation is used the water flows into one nostril and out of the other; when the water is snuffed up it is drawn into the pharynx, whence it is expelled through the mouth. In either case the head is held forward during the treatment. The "snuffing up" procedure often produces a detrimental effect in cases of a sinus infection and is not for regular use.

Nasal Irrigation, Objections to

Irrigation of the Stomach.—See *Lavage,* and *Stomach Washing.*

Irrigation of the Throat is commonly called *gargling.* For this a fair amount of water is taken into the mouth and passed back into the pharynx where it is held by closing both downward passages—the windpipe and the esophagus. Then air is forced up the windpipe and through the epiglottis, or shield protecting the larynx, by a slight exhaling action. This air creates a bubbling or gurgling of the water which brings it into contact with the various post-nasal structures. Gargling with very hot water, or alternate hot and cold water, is very good in cases of chronic pharyngitis, dryness or rawness of the throat, and hacking and tickling cough. But there are many affections of the oral and post-nasal structures which will not be benefited by this treatment.

Gargling

Irrigation of the Rectum.—See *Rectal Irrigation.*

INTERNAL BATH.—See *Enema.*

INTERNAL CLEANSING.—By this is meant the introduction of water into any of the cavities of the body. The term is generally used to designate a "flushing" of the digestive tube by an enema, or by an intestinal irrigation, or by washing out the stomach by means of a stomach tube. The advantages of this treatment, by means of hot or cold water, have been demonstrated by the experience of all ages, and the simplest and most natural method of introducing the water is by the process of drinking.

Internal Cleansing

Often the stomach is the seat of catarrhal inflammation —a "low-grade" inflammation not accompanied by the usual signs and symptoms, but nevertheless an inflammation. In this condition the mucous membrane of this organ secretes or, rather, excretes a slimy "catarrhal" substance, more or less ropy and adherent. If one with this condition—or one of numerous other abnormal conditions of the stomach—will slowly sip from one-half to one pint of water at about 110 degrees, an hour or two before meals, the slime and mucus will be washed out of the stomach. It is advisable, however, to change from hot water to cool water, and later to cold water, as soon as possible, for the tonic effect of the lower temperature. With water at any temperature (hot, cool or cold) the blood will be able to take up extra moisture—a very necessary process in any abnormal condition. Those who suffer from practically any of the diseases that arise from defective digestive processes will find the use of the "stomach bath" by hot water sipping of great benefit, especially from the brief use of the hot stomach bath. One well versed writer states: "It excites downward peristalsis, dilutes the ropy secretions of the body, dissolves all abnormal crystalline substances that may be present in the blood and urine, and everywhere promotes elimination. It supplies a foundation for the thorough treatment of all chronic diseases."

The Stomach Bath

At many hot springs people are required to drink the waters at certain intervals, generally at 6 A.M., 11 A.M., 4 P.M., and 9 P.M. With the average person's more or less superstitious belief in the advantageous effects of the (to them) mysterious substances that are supposed to be found in these waters, the benefits that occur are generally attributed to these mineral elements. It may, however, simply be the hot water that produces the good effects, by the washing process before referred to. If the individuals who receive benefit at these springs would drink plain hot water (or perhaps even cold water) in the same quantities and with the same regularity at home as they usually do while at the springs, they probably would get about the same result from this simpler and less expensive treatment. It seems sometimes as though there were a large psychological element in this treatment at the different spas. When one remembers that it is

Hot Springs

quite expensive to get to the springs as well as to meet hotel expenses, medical fees, etc., and when one considers the fact that the patient is usually far from home, among hundreds of other patients, and that he is under the direct supervision of a physician at all times, one can well understand that the patient will follow instructions minutely. This is something which he might not be so apt to do at home, where he would probably see his family physician only occasionally and would not put much faith in plain water drinking, nor in his physician, either, for charging him a fee for such a prescription.

There is little doubt that hot water used internally is of greater benefit in some diseases and where the vitality is low than is cold water. But when it is necessary to reduce the body temperature cold water is very valuable. Two or three pints of water at, say, 40 degrees, will cause a reduction of temperature of from one and one-half to two degrees within the short space of ten minutes. It is not only by the absorption of heat that it produces this result, for water at any temperature dilutes the blood, which promotes evaporation from the skin and excites the kidneys to increased activity, thereby aiding in the elimination of the blood toxins that are causing the fever. In almost all fever cases a glass of cool water sipped slowly every hour is of great value.

Cold Water

At many cold-spring resorts the patients are required to drink large quantities of the cold spring water, for the supposed benefits to be derived from its mineral ingredients, and, immediately after drinking it, they are required to take walks of greater or lesser duration. The vaunted medicinal virtues of the water are given the credit for whatever health improvement results. But as with the hot-spring water, the improved health may possibly be due to the effect of the water itself upon the blood, the tonic effect of the walking in the open air, and the general relaxation. Effects equally favorable in kind and degree could be procured at home by following the same regimen, even though the water used (if pure, of course) might be from any other source than a mineral spring.

When water drinking is objectionable to the patient, or when for any reason it is inadvisable, it can often be introduced into the body almost equally well by means of an enema.

JAPANESE HOT BATH.—See under *Full Baths.*

LAVAGE.—Gastric lavage is the proper term for irrigation of the stomach, though usually the simple term "lavage" is employed. Lavage is performed by means of the stomach tube, which is a perfectly smooth, soft, flexible rubber tube of a caliber large enough to pass easily into the stomach through the esophagus. There is usually a small black ring marked on the tube, and, when the tube is introduced into the mouth as far as the ring, the lower end of the tube will be in the stomach. The end which is passed into the stomach is rounded and has a large opening at the side. A funnel is introduced into the other end of the tube through which the fluid used is poured into the stomach. When it is desired to empty the stomach the funnel end of the tube is lowered into a basin

Cleansing Lavage: What It Is



Washing out the stomach (lavage). One end of the tube has been passed into the stomach; the liquid used for lavage is poured into the stomach through the funnel. When the proper amount has been introduced, the funnel end of the tube is lowered to the basin and the patient instructed to cough or strain. This forces the fluid up through the tube and it then siphons out into the basin.

which should be below the level of the stomach, and the patient directed to strain or to cough. This will cause some of the contents of the stomach to regurgitate up through the tube and the entire contents will then siphon out. In introducing the tube, the tip is passed into the back of the mouth and the tube is swallowed a little at a time until the lower end reaches the stomach cavity. If the patient realizes that only the tip need be swallowed, the rest will go down easily. By this means the stomach may be cleansed as completely as can the colon by means of the colon irrigation. Some individuals master the use of this tube for home use and give themselves regular lavage—very often to their detriment, as with the overuse of the enema.

Usually water at about the temperature of the body is used; but either hot or cold water may be employed. Plain water may be used, or table salt or sodium bicarbonate may be added, a teaspoonful of either to the quart of water. In withdrawing the tube it is very important that it be completely closed by pinching at the teeth, before extraction is begun. It should then be taken out quickly but not with a sudden jerk.

Stomach Pump

The *stomach pump* is often used to forcibly wash out the stomach. Many persons needing this treatment, especially in emergencies, are in no condition to be of assistance themselves in the process. Attempted suicides, or persons comatose from acute alcoholic or other form of poisoning must have their stomachs rapidly and forcibly emptied. The stomach pump is similar to the stomach tube except that there is a rubber bulb situated mid-way of the tube. To empty the stomach with the stomach-pump, introduce the tube into the stomach forcing the jaws open for the purpose and keeping them open with a gag to prevent the patient biting the tube through in his delirium, or his struggles, if he is not comatose; then pinch the tube tightly above the bulb, having first compressed the bulb with the hand; release the pressure on the bulb when a vacuum will be created into which some of the stomach contents will run. Now compress the tube below the bulb and squeeze the bulb. This will force the contents of the bulb out of the tube. Repeat this process until the stomach is empty. The greatest precaution should be observed in using either the tube or the pump in cases of poisoning by corrosive

substances, such as the bichloride of mercury, as the walls of the stomach may be corroded and weakened, rendering perforation quite possible.

Lavage is of special value in some cases of poisoning and severe cases of catarrh of the stomach, also in several organic diseases of the intestinal tract. But in most cases of emergency an emetic will clear the stomach more quickly. In fact, in most cases where the stomach walls are not greatly stretched and dilated through loss of muscle tone the water emetic will be preferable. At any rate one should not begin the lavage except upon recommendation of a physician.

Local Applications

Local Applications.—There is practically no hydriatric application that cannot be used on some local area, and practically no local area to which an application cannot be made without pronounced involvement of other regions. For greatest good in a great many affections there must be local applications, for only by these may there be brought about a sufficient change in the local circulation to produce healing



The stomach pump in use. One end of the pump is introduced into the stomach; the bulb is compressed and the tube pinched off between the bulb and the funnel. When the bulb is released some of the stomach contents are drawn into it. The tube is now pinched off between the bulb and the patient's mouth; then the bulb is compressed forcing its contents into the basin. This is repeated until the stomach has been thoroughly emptied.

and repair and restoration of normal functioning. General applications are of inestimable value for the eradication of general toxemia and for numerous other effects. But in many instances the local congestions and anemias cannot be corrected without measures that directly affect the local regions.

Throughout this section the conditions mentioned as indications for various applications point to the need for local measures, but it is not to be concluded that the general measures can be dispensed with in such cases. For the most perfect results both general and local measures are necessary in a great many cases, perhaps in the majority. The idea is to bring out here the importance of local procedures, which so many people are inclined to forget, neglect, or ignore, and the need for general measures by those who have become enthusiastic over local measures. The various regions that may be treated locally and the various applications that may be given locally need not be enumerated here. They are given in the discussion of diseases and abnormal conditions and their treatment in this and other volumes.

Low Enema.—See *Enema.*

Massage.—Though massage is often given in connection with some water treatment it is not a hydriatric measure, hence has been considered elsewhere. See Vol. VII.

Massage Douche.—In this treatment massage kneading is given simultaneously with the application of a stream of water to the surface of the body. During the kneading the tissues are pressed firmly but intermittently with the palms of the hands and the thumbs and fingers. In other words, the manipulations are deep enough to affect the blood vessels in the muscular tissues, not only those in the skin. The parts usually so treated are the back, abdomen, arms and legs. Rheumatic joints especially may be treated by this procedure. When possible one attendant gives the massage while the other pours or otherwise applies the water.

Massage Douche, Uses of

This application is sometimes called for where there is pronounced sensitiveness to cold and yet the stimulating effect of the cold douche is required. The massage given with the water application mitigates the sensation of cold. While most effective in producing the desired results, the procedure at the same time lessens the susceptibility to colder applications.

The kneading of the massage combines with the temperature and the mechanical effect of the jet to produce results far deeper in the body than can be produced by either procedure alone. Thus the massage douche is one of the most powerful of all hydriatric applications. The water used may be very hot or very cold or any temperature between, as the condition of the patient indicates. The best temperatures are hot, cold and neutral.

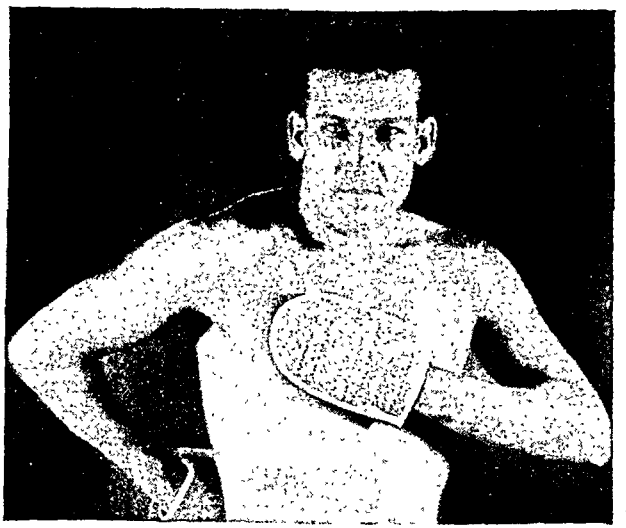
The cold massage douche is a powerful tonic. It is also very beneficial in cases where joints have been left stiffened by chronic rheumatism or other inflammatory process, providing there is no pain. It should be used with care in painful conditions. In giving the application in such cases as stiffened joints, not only should the joints be treated, but also the soft tissues above and below these parts. Still better results will be secured if a heating compress is applied to the joint, to be worn between treatments. The cold massage douche should not be used to acutely inflamed joints, but if used above

Cold Massage Douche



In giving the massage douche, one of the most powerful of all hydriatric applications, the most important work is that of the palms of the hands and the thumbs and fingers while the water is poured upon the surface of the body. The water should be applied directly to the part receiving the massage, both treatments being simultaneous to the same tissues.

and below the joints the effect will be favorable. In these cases the joints should be *protected by cloths* or towels.



The use of friction mitts or an ordinary soft wet scrubbing brush is a very satisfactory means of producing friction.

Cases of lumbago and sciatica that have resisted other treatments will be much benefited by the cold massage douche; but it should be used only in those cases where the kneading or other pressure causes no pain. If this procedure is not well borne or proves too stimulating, the *hot* massage douche may be used with good results. This douche may also be used in numerous other cases where a cold application is to follow to increase the effect of the latter treatment. Sleeplessness is often overcome by the use of the *neutral* massage douche to the lower extremities, where the neutral douche alone will fail. The neutral douche may be used at first for those sensitive to the cold, the temperature being gradually lowered from day to day until cold can be borne with comfort and benefit.

MISCELLANEOUS BATHS.—See *Air Baths, Air Douche, Alkaline Baths, Emollient Bath, Mud Bath, Mustard Bath, Nauheim Bath, Pine-Needle Bath, Saline Baths, Sand-Bath* and *Shampoo, Dry.*

MITTEN FRICTION BATH, COLD.—This is given like the *Wet-Hand Rub* (which see), except that a special mitten is used for the purpose. Coarse mohair may be used, or some other material that is sufficiently rough to stimulate the skin yet not of such nature as to irritate it. A special cloth resembling haircloth, manufactured in Turkey, is particularly adapted for this purpose, being used in the Turkish bath establishments of that country and of Egypt. One advantage

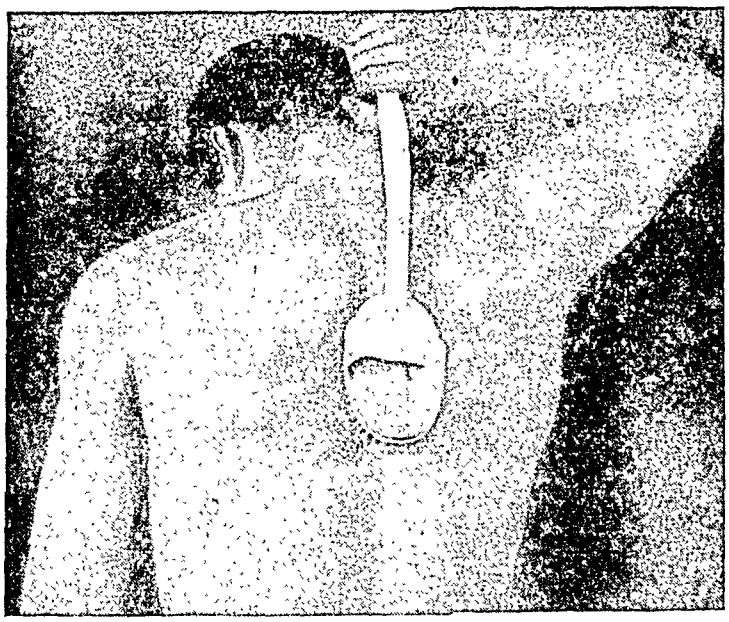
Cold-mitten Friction Bath

of this cloth is that it is of such texture that it will hold little or much water as desired.

There is no bath, outside the percussion douche and the massage douche, which equals the cold-mitten friction bath for producing vigorous and prompt reaction. It is a very powerful tonic, and aids greatly in regulating nutrition. The friction given at once upon the application of the cold water prevents tardy reaction, frequent when most other cold applications are employed. Both thermic and circulatory reaction are vigorous after a properly administered cold friction bath. Not only this, but, by reflex action through the superficial nerves, the entire internal organism is affected. Much colder water may be used in the mitten friction bath than with the douche and several other applications; and the reaction will be more prompt and vigorous because of the skin stimulation. The application has the advantage, besides, of being convenient to apply in every home, provided a satisfactory mitten can be obtained.

Mitten Bath, Application of

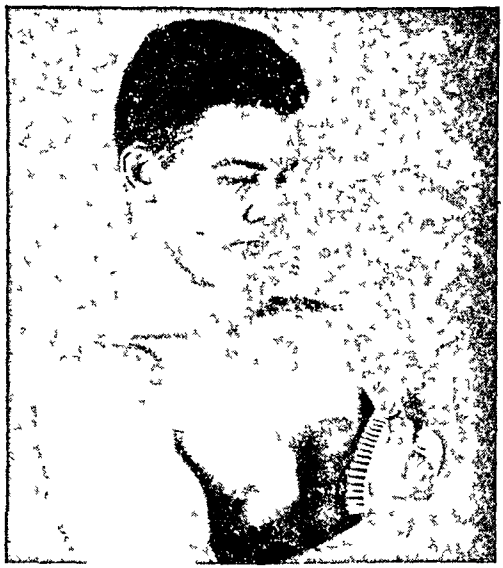
The treatment may be given in bed or with the patient standing, and it may be better for him to stand with his feet in a basin of water at a temperature of from 100 to 106 degrees. The mitten may be ice-cold, very cold, cold or cool, in accordance with the condition and needs of the patient, and the quantity of water may also vary. One may saturate the mitt with water (filled mitt), or merely dip it in the water and shake off the excess (wet mitt), or simply wet the palm of the mitt (moist mitt). In accordance with



A little ingenuity will enable one to reach every portion of the body, in giving the friction bath.

the amount of water used different effects are obtained, but the differences are in degree rather than kind.

Friction may also be used during any cold bath in which friction is desirable to aid reaction or counteract the loss of heat through increased skin circulation as during the Brand bath and sometimes in the cold shallow bath or cold sitz-bath. However, in these cases the friction given with the bare hand is usually better.



In using the friction bath, whatever the mode of friction, it is well to remember that movements upward or toward the heart aid circulation better than friction from the heart.

In giving the cold-mitten friction the first step is to wet the face with cold water. If the patient is lying down a wet cloth may be placed over the face. Then a small part of the trunk, preferably the front, is exposed and quickly frictioned with the mitt or brush which has been dipped into water at the desired temperature in a basin near the head of the couch or treatment table. This part is frictioned until reaction is established, as indicated by the reddening of the skin. When this is assured the part is rapidly dried and covered. Then one arm may be grasped with the left hand and frictioned with the mittened right hand, then the other arm treated similarly. From this the legs, back, hips, back of the legs and feet (in this order) are similarly treated, except that the soles are lightly slapped instead of being rubbed. Each part must be quickly dried and covered, after reaction is secured, before proceeding to the next part. If the patient is standing during the friction the same order may be followed, also the same method of covering after reaction. But if the vitality of the patient is high, either the entire front of the body may be frictioned before the back, or the upper half before the lower half.

Mitten Bath, Cautions in the Use of

There are few conditions in which cold-mitten friction may not be used to advantage, except, of course, when the skin is broken or when there are skin eruptions. Among the conditions in which the application is of great benefit are: anemias, catarrh of the intestines, chronic kidney disease, emaciation or thinness, heart disease, hysteria, influenza and grip, loss of appetite, migraine, neurasthenia, paralysis agitans, pulmonary tuberculosis and other wasting diseases, reduced energy and vitality from any cause, reduced gastric acidity (hypoacidity), rickets, stupor and unconsciousness (coma), typhoid fever when the Brand bath is too severe a measure, and other fevers. It is a most excellent form of treatment for children, but the intensity of the friction must be well regulated to suit the case.

MUD BATHS.—This is a form of treatment to which a certain school of European hydropathic or "Nature Cure" enthusiasts are much devoted. And it must be said that mud baths have given decided benefit in many cases by aiding in the elimination of wastes in the body and thus overcoming or reducing disease. However, there is much doubt as to whether this is the best treatment for such purposes. In most countries mud baths have never been used extensively. There are treatments that are more cleanly and more convenient, and just as effective.

Mud Bath, Kind of Soil for

There are different ways of taking mud baths. In one, moist clay is used when obtainable, rather than ordinary mud or "wet dirt." The mud or clay is of such consistency that it may be "plastered" upon the body, but sometimes, after it is applied, it is held about the body by loose cloth wrappings. In using mud and clay baths in this manner, it is absolutely necessary that the earth be sufficiently warm to insure comfort. Prolonged contact with cold damp earth would have the effect of chilling the body and reducing the vitality to a greater or less degree. The treatment, therefore, is of service only in warm summer months, or when there are special arrangements to provide warm earth and a warm environment. These baths largely exclude air from the body, and for this reason are not so very desirable. A wet-sheet pack is much more convenient, much cleaner, and doubtless more effective in many cases.

Another method of administering the bath is to allow the patient to lie in a special tub, covered to the chin in mud about as thick as mush. Instead of clay, earths that have been analyzed and determined to contain alkaline or saline elements may be used. These elements stimulate the skin and the circulation in and under the skin, the particular effects depending upon their nature and strength. The general supposition is that the minerals are absorbed by the body; but this is an erroneous belief, for the skin cannot absorb such elements. Their effect is due strictly to the skin stimulation they produce, and some form of general bath, particularly the effervescent bath, is preferable when such superficial stimulation is desired.

There is one very important consideration to be kept in mind concerning the use of mud baths. The soil should be the natural soil of a locality free from the taints of civilization. In other words, one should go far afield or into the woods for the earth, so that it may be absolutely free from contamination. Even a healthy person should not be subjected to the dangers of contaminated earth, however slight it may be. Hence it is obvious, since it is those who are diseased and reduced in vitality who need such treatment as mud baths, that extreme care should be taken to avoid possible infection from impure soil.

Precautions in Using Mud Baths

The covering of open sores or wounds with mud, as recommended by some of these enthusiasts for mud-bathing, is not to be recommended. Trifling wounds have become dangerously infected through the use of unclean earth, leading to weeks of suffering when healing should have taken place within a few days at most; and even if the earth is absolutely free from contamination of any sort, the covering of an open injury prevents normally rapid healing. When the skin is unbroken, local packs of mud are often very effective in relieving the pain and inflammation of rheumatism, gout, strain or bruise; but hot wet cloths (See *Fomentations*) or dry heat (See *Hot-Air Local Bath*) will act far more quickly and certainly, besides being more cleanly and convenient. And for open wounds or sores direct exposure to the rays of the sun or a sun lamp (See *Sunlight*) is superior to all external treatment.

Mustard Bath

MUSTARD BATH.—Occasionally it is desirable to produce powerful stimulation of the skin. For this purpose the mustard bath is excellent. One need not fear any other effect of the bath than cutaneous stimulation. That is, the mustard cannot be absorbed into the body. To prepare the mustard bath, steep two ounces (about three or four tablespoonfuls) of freshly ground mustard in a quart of hot water, for about ten minutes; then add this to the ordinary full bath of about thirty gallons of water, stirring it thoroughly into the water before entering the bath. See *Pine-Needle Bath* for effects and use, since the two baths are similar in effects and indications. Mustard baths are very commonly used with good effect in infantile convulsions and in eclamptic seizures.

Mustard Fomentation

MUSTARD FOMENTATION.—A mustard fomentation is an intensified ordinary fomentation, made as follows: A tablespoonful (about half an ounce) of freshly ground mustard is added to a quart of boiling water and steeped for a few minutes. The fomentation cloth is saturated with this liquid, wrung quite dry, and applied to the part to be treated. Additional fomentation cloths are placed over it instead of directly to the part or to a non-stimulating cloth. When care is taken not to blister or greatly irritate the skin, this is an excellent application for relieving extreme pain. Naturally it should not be employed when the mustard is likely to come in contact with any open sore or already existing skin irritation, or any mucous membrane. Muscle and joint and deep-seated pains may be treated with the mustard fomentation. See *Fomentations*.

Nature Bath, Origin of

NATURE BATH.—This name is used somewhat arbitrarily for a form of sitz-bath, or shallow bath, much practiced by a school of Nature Curists in Europe. It was originated by Adolph Just of Germany, who had observed that some animals are accustomed to wallow or rub their buttocks and abdomens in the mud of shallow water; but there is no reason why it should be singled out for the rather pretentious title of "Nature" bath. A mud bath may be considered as natural a bath as this one, while the plunge and the shower of a natural rain may each lay claim to being the most *natural* bath.

The method of taking the bath is to sit in a bathtub, with the knees drawn up and considerably separated, in about

three and one-half inches of cold water, thus only partly immersing the hips, the external genitals and the feet. While sitting in this shallow water the bather scoops up water with one or both hands and vigorously splashes it over the front and sides of the abdomen, briskly rubbing the abdomen and the groins with the hands. Following this the entire body should be quickly splashed and rubbed, the best procedure being first to bathe one arm with the other, then reverse, then bathe the chest, then scoop up water in the hands and pour over the shoulders (if the vitality is high, otherwise omit this part of the bath), then extend the legs one at a time and rapidly friction them with the open palms, constantly bringing up water. The drain in the tub should be opened immediately before extending the first leg.

An attendant may assist in the bath, if needed, after the abdomen and the external genitals have been bathed. The body is not usually dried by towel, but is rubbed with the bare hands until dry. If the vitality is low a towel may be used, or the patient may be covered with a Turkish sheet and the body spatted and rubbed *over the sheet* by the attendant. When possible the body should be dried by the patient's own hands, since the exercise is a valuable part of the treatment. Such baths should not be taken unless the body, and particularly the hands and feet, be fully warm; and, as with all cold baths, it is advisable that the room be at a comfortable temperature. A nude air bath, in the room or in the sunlight, with additional exercise immediately following the bath, will add to its benefits. If reaction is not prompt and complete by this method, it will be necessary to cover the body with woolen blankets, perhaps also to supply artificial heat. But if such after-treatment is required it would be far better to avoid the bath entirely.

Nature Bath, Application of

The bath may continue for only a minute or two when the weather is cool or the vitality low, but there is no objection to continuing it for ten or fifteen minutes if the weather is warm or the vitality high. The greater part of the bath is devoted to rubbing the immersed parts and the abdomen, only a short time being given to the rest of the body. The bath may be taken daily, or according to the desires and conditions of the individual. Only natural cold water is used, except that

there may be tempering to 60 degrees for the individual with low vitality.

Nature Bath for the Indications

The Nature bath is a very satisfactory form of bath for many people, and is enjoyed by a good many people who do not enjoy other forms of bathing. But in many ways the regular cold sitz-bath is to be preferred, since the reaction from this is more powerful and more centralized to an important region of the body, while, owing to the fact that the extremities are kept out of the cold water, it is a much easier bath from which to recuperate. While this consideration may be of little importance in most cases, it is an important one for those of poor circulation and reduced vitality. For overcoming sexual weakness, especially in men, this Nature bath is recommended. See *Cold Sitz-Bath,* under *Sitz-Bath.*

NAUHEIM BATH.—The Nauheim or Effervescent Bath receives its name from the Nauheim Baths, famous natural mineral baths of Germany, where it was first employed. Treatment by Nauheim baths is also called the Schott method, after two German physicians of that name who used these baths, in conjunction with graduated resisting movements, in the treatment of heart and vascular (blood-vessel) diseases. In this country and elsewhere artificially mineralized and carbonated waters are used for these baths.

Nauheim Bath

The Nauheim bath acts as a mild irritant to the peripheral nerves, causing primary contraction and secondary dilation of the blood-vessels, first of the surface and then internally. The total result, apparently, is to so diminish the strain upon the heart that it secures a degree of rest, leading to increased metabolism and hence better nutrition.

Nauheim Bath, Effects of

The ingredients in the bath make it possible to use somewhat colder water with less shock to the patient. The mineral elements used are sodium chloride (common salt), calcium chloride, sodium bicarbonate (baking soda) and hydrochloric acid; or, leaving out the last-named ingredient, sodium carbonate (sal soda) and sodium bisulphate. The combination of the elements leads to the production of carbonic-acid gas (carbon dioxide), and thus causes an effervescence; hence the name "effervescing bath." The proportions of the various ingredients govern the effects. The baths at first are from eight to ten minutes, and at a neutral temperature of from

Nauheim Bath, Ingredients of

92 to 95 degrees. The temperature is then reduced one degree each day until 80 degrees is reached, and during this reduction the saline and gaseous strength of the bath is increased.

Artificial Nauheim baths may be administered in the patient's home, using only porcelain or wooden bathtubs, never metal-lined ones, with table salt, bicarbonate of soda, calcium chloride and a few ounces of dilute commercial hydrochloric acid in the water. However, such baths should be attempted only under the personal supervision of one thoroughly versed in their technique and use. While they are of much value in certain cases of heart and vascular disease, causing contraction of a dilated heart to an appreciable extent, they may be injurious when improperly employed. As we shall see elsewhere, the heart can be benefited and strengthened by other hydriatric methods of a more simple nature. Artificial Nauheim Baths

NEEDLE BATH.—The needle bath is a form of shower bath in which the water strikes the body or parts of it in very fine streams and with considerable force. The usual form of apparatus for this bath is three or four rings one above the other, broken at one side so that the bather can enter. Another form is a spiral in the center of which the bather stands. In either case the small streams of water converge toward the center so as to strike the body. The force of the streams has a pronounced tingling effect upon the skin, and produces prompt and vigorous reaction. There is no particular value in this bath above the shower, for certain effects, and the horizontal jet, for other effects. It is not to be employed in the case of hypersensitive nerves of the skin, general nervousness, and numerous other conditions in which hyperfunction or nervous irritation is manifest. In many conditions of subfunctioning the bath will be an agreeable, stimulating tonic. Needle Bath

Indications for Needle Bath

NEUTRAL BATH.—See *Full Baths or Immersion Baths.*

NEUTRAL COMPRESS.—See *Warm or Neutral Compress,* under *Compresses.*

OIL RUBBING.—Oil rubbing has been used since ancient times, usually in connection with baths. The Egyptians and Romans used oil after bathing, or, rather, had the oil rubbed on them by others. There is nothing scientific in the application of oil, for it is merely applied by the hand with rubbing usually in the direction toward the heart. When the skin is Oil Rubbing

softened by warm baths it more readily takes up the oil, hence the emollient does more good at such times. When applied to dry skin, it is somewhat disagreeable at first to many people, but the later effect is to give a satisfying sense of skin elasticity. Only a small amount of oil should be used, any excess applied being removed by gently rubbing with an absorbent towel after the treatment is completed. Cacao (cocoa) butter is the best oil to use, though olive oil or other vegetable oil is beneficial. Vaseline also is good, though no mineral (or animal) oil or fat is as satisfactory as a vegetable oil. Any oil having the slightest rancidity or staleness should be discarded. This is one reason why animal oils and fats should not be used, for they easily become rancid. The skin does not absorb oil so this element does not actually enter into the blood. Fatty acids of rancid oil which are volatile, are of course, detrimental. For esthetic reasons, as well as to prevent skin irritation, they should be avoided. Oil rubs may be given daily in many cases; but there should be complete removal of the oil and perspiration at least twice a week with good soap baths.

Oil Rubbing, Kinds of Oil for

Dry friction is often too stimulating, through mechanical irritation of the peripheral nerves. Oil rubbing has mechanical effects similar to dry friction except that these effects are less pronounced, and usually there is a soothing effect. The skin will be considerably irritated by dry friction continued for some time, as when rubbing a swollen or chronically inflamed joint. The dry skin common to many people in winter, especially when daily baths are taken, may be avoided and the skin kept fairly soft and free from cracking, chapping or chafing, if a small amount of oil is rubbed into it several times a week, say every second day. Some say that oil always should be rubbed into the skin after soap baths, to replace the natural oil lost by the bath. But it seems to be the case that if proper tonic baths are taken, followed by such friction and exercise as to restore normal skin circulation, there will be quick response by the oil glands of the skin—if the diet is at all satisfactory and digestion and assimilation fairly normal. Still, if there is a special susceptibility to cold or to taking cold, also sluggish reaction, oil rubs after water baths will aid greatly in bettering the condition. Also, when the oil glands

Oil Rubbing, Effects of

are deficient in activity oil rubs should be used after baths, especially after hot baths, whether with or without soap. In all cases care should be taken to avoid causing perspiration from the friction.

The nutrition of infants and children is favored by oil rubbing, largely because of the effect upon the circulation and nerves. In most cases of loss or of deficient weight, especially with definite digestive troubles, and of thinness with dry skin, also in diabetes where the skin is usually quite dry, oil rubs are beneficial. Oil rubs aid also in preventing flying particles of skin from permeating the atmosphere of the sick room. In cases of infectious diseases this is not of any particular moment except that it may satisfy those who still believe these particles to be the chief source of the spread of such diseases.

Benefits of Oil Rubbing

OPEN-AIR BATHING.—The various forms of cold-water bathing discussed in this section are only substitutes for the oldest and most natural form of bathing, which consists of plunging joyfully into the generous bosom of river, lake, or sea. In temperate latitudes this is not possible at all times of the year; but this is all the more reason why we should avail ourselves of any opportunity for open-air bathing which we may have during the summer months. For the small boy (or the grown-up boy, for that matter) there is nothing like the lure of "the old swimmin' hole"; and for all those who retain through their adult years any traces of their youth there is no pleasure quite like the keen delight of splashing and sousing oneself in cool and refreshing open-air waters.

Open Air Bathing

Happy and fortunate are those men and women who live near enough to such conveniences to take daily advantage of them during several months of the year. The less clothing one can wear in these outdoor baths the better. There is a moral and mental as well as a physical tonic effect that comes from the direct exposure of the whole surface of one's body to the air and water. Thus only can one have the perfect bath. Fortunately the present-day bathing costume is reasonably brief and unhampering, and bathing in such a costume is extremely beneficial, as millions will testify.

A few general rules should always be observed by the sea or fresh-water bather:

1. Never bathe when exhausted physically or nervously,

or when the vitality is low through loss of sleep or other cause.

2. Never bathe less than an hour after or before a meal. However, if one is on fruit diet alone this time may be cut to thirty minutes, or perhaps in some cases, even less.

General Rules for Open Air Bathing

3. When possible, enter the water quickly. The longer the sensation of shock is prolonged the less prompt and complete is the reaction and the less beneficial will be the bath. Get the chest and shoulders covered with water as speedily as possible. The best way is either to dive in, or to run forward as far as possible—or until the water is deep enough—and then dive headlong into the first breaker that comes, or plunge into the deeper water if there are no breakers. In other words, make it a "plunge."

4. One naturally feels a chill upon entering the water at a temperature lower than that of the body. After this first chill, however, there is generally a speedy reaction and a feeling of invigoration, provided the circulation and vitality are good. As soon as (or before) the body begins to experience a *second* chill, one should leave the water immediately, as the power to react after a second chill is much less than after the initial chill.

Fresh-Water Bathing.—In the nature of things only a comparatively limited number of people are so located that they can enjoy the pleasures of salt-water bathing. But through the kindly provision of Nature there are few localities in which men dwell where there is not somewhere in the neighborhood, or not far distant, a stream of water or a lake in which bathing may be enjoyed. The automobile brings bathing places that once were considered far distant now within a few minutes' pleasurable ride. Fresh-water bathing is nearly as satisfying, thrilling, and enjoyable as salt-water bathing, and there are many people who prefer the fresh water. They have one advantage, in that bodies of fresh water are usually warm enough for bathing in comfort much earlier in the summer and later in the autumn than is the sea, unless the streams or lakes are rapid and fed from mountain streams or cold springs.

Fresh-water Bathing

The general principles which have been outlined for successful results with other forms of cold bathing may be and should be followed when bathing in the open air. There is

the same necessity for normal warmth of the body before entering the water and for perfect recuperation on leaving it. The likelihood of delayed reaction and of chilling is often greater because of the cooling breezes. When bathers shiver and talk through chattering teeth, they are getting no benefit from their bath, either because the water is too cold or they remain in too long. If one feels chilly before entering the water, it will usually be detrimental to go in unless, by moderate exercise, deep breathing, and friction, the circulation can be speeded up and warmth reestablished. A person of high vitality and robust body may occasionally be warmed through and through by the reaction following immediately after a cold plunge, even when somewhat chilly before the plunge was made, but one should be sure that such vigorous reaction will take place before attempting to enter the water in this condition, and it would be unwise to linger in it after reaction is complete.

General Principles Open-Air Bathing

The temperature of both the water and the air are to be considered for real pleasure in and good results from the bath. If one finds the plunge and the swim a source of comfort and delight, then the bath usually will do good. But if one dreads to "duck" and get wet, or even to enter, and the entire bath seems to be a hardship, then it should either be shortened or omitted altogether, for it will not be wholly beneficial. In many cases the water itself may be warm enough to make bathing a pleasure, but a cold atmosphere makes it hard to keep warm except when immersed in the water, or to recuperate afterward. Sometimes it is very unwise for the delicate man or woman to take the open-air bath at all on any but a decidedly warm day. Certainly it should not be done on a raw and chilly day, though one who is vigorous usually need not hesitate on this account. As has been said elsewhere, there are some who can enjoy a dip in a lake or the sea at any time the year round; but this certainly cannot be advised for everyone.

Water and Air Temperatures

Without regard to individual differences in vitality and reaction, the colder the water the shorter the period of time one should remain in it. This general principle of cold-water bathing applies to the average man and woman. The athletic and vigorous individual will usually know his limitations in

the matter, or should—for he should be sufficiently acquainted with bathing under various conditions to know his response to it under these conditions. However, many young athletes and robust youths, who have good bodies and enough natural prowess to enable them to become more or less successful in their physical endeavors, really know very little about hygiene, *building* a good body, or preserving good health. As a rule, nearly everyone, from the schoolboy or urchin in the creek or pond to the middle-aged man or woman at the seashore, stays in the water too long to get really good results from the bath and sport. As with eating, one should desist while still feeling that further indulgence might be enjoyable.

Precautions in Outdoor Bathing

Half an hour may be long enough to stay in the water on a summer day when both water and air are balmy. When either the water or the air is cold, the time should be shortened; and if both are cold the bath should usually terminate as soon as the plunge is completed. A ten-minute or even a five-minute bath that leaves one invigorated and comfortable is far better than a bath of an hour or two that leaves one weak and trembling, or cold and depressed for the rest of the day, or for several hours.

While taking a bath or swim on a chilly day, it is better to stay in the water until ready to dress, for exposure to the air when wet will chill the body much more quickly than will immersion, because of the rapid heat radiating from the body. Basking in the sun and covering with the beach sand, which usually "feels good" and keeps one warm, may be recommended for as long as it is enjoyed without danger of overexposure to the sunlight. When the weather is favorable, it is beneficial for one who has several hours of freedom to pass at the waterside to spend short periods in the water and long ones in the sunlight on the sand, provided he becomes accustomed to the régime so gradually that there will be no severe sunburn and no depression. This is especially commendable when the water is cold and the air and sand warm, provided the plunges are an hour or two apart. This applies equally to inland lake and sea-shore bathing. If one lounges on the sand between plunges beneath an umbrella or other sun-shield, one may roll out or run out into the sunlight for several minutes at a time quite frequently without danger of

serious sunburning, even before becoming fully accustomed to the sun.

Salt-Water Bathing.—The water of the seas, because of the salt contained in it, has a certain tonic effect upon the skin which is lacking in fresh water, and a dip in the ocean is especially to be recommended for this reason. Indeed, it is a good plan to have on hand a supply of sea-salt for use in the bathtub at home, in connection with the morning cold tub, if one enjoys this form of cold bath and cannot secure ocean bathing. Salt-water Bathing

The suggestions which have been offered in regard to fresh-water bathing will apply here as well, though in regard to the duration of the bath it will be found that, other factors being equal, one can usually remain in the salt water a little longer, with benefit, than in the fresh water. The salt acts as a tonic. Furthermore, there is usually a percutient effect of the waves or breakers to increase the circulatory response and mental invigoration. For a swimmer, or for anyone else who is compelled to be in the water a long time, it is a very good plan to have the entire body covered thoroughly with olive or other oil or grease. This will protect against too great loss of body heat,—because the loss of heat by radiation is safeguarded and conserved better with oil than without it. It will also prevent too great extraction of the skin oil; and, in impure waters, it offers protection against any contamination which may be present. The average swimmer is not in the water long enough, however, to make this precaution necessary.

For true exhilaration bathing in the surf takes first place. There is nothing else in the way of a bath quite so stimulating—when not overdone. Fighting the heavy surf and being buffeted about, perhaps rolled over and over by the mighty and resistless force of a breaker, splashed and soused and tumbled about, stung by the salty spray, whipped by the incoming breezes—all this indeed awakens every living cell in the body, arouses a new sense of life in every fiber, and seems to impart to the vital organs some of that resistless power which surges in the rolling billows themselves. Exhilarating Effect of Salt-water Bathing

Swimming is a delightful form of exercise in which bathing and exercise are combined. But since it is a valuable exercise

for developing strength and symmetry of the body and is not an essential part of bathing for the sake of health, it is discussed among outdoor sports and exercises, in Volume III. Diving and artificial respiration are also taken up in the same place, the latter being an important part of the equipment of a swimmer, as he never knows when he may be called upon to revive a drowned person.

OUTDOOR BATH.—See *Open-Air Bathing.*

PACKS.—See *Blanket Pack, Hot; Dry Pack; Girdle or Abdominal Pack; Half-Pack; Wet-Sheet Pack; "T"-Bandage* (sometimes called pelvic pack) under *Compresses.*

PERCUSSION DOUCHE.—See *Douche Bath.*

PINE-NEEDLE BATH.—In this bath pine-needle extract is poured into the ordinary bathtub of water at the temperature desired, in sufficient quantity to bring about reddening of the entire surface of the body. The temperature of the water can be lower for this bath than when plain water is used, since the extract is a decided stimulant to the skin and encourages reaction. The usual temperature is about 92 to 94 degrees, and the bath should be only slightly stimulating at first. The conditions in which it is of particular value are chronic heart and kidney diseases.

Pine-needle Bath

PLUNGE, COLD.—This is one of the most satisfying forms of cold bathing for those who enjoy cold bathing at all; and, while some delicate persons may find it too rigorous, it can be made very generally agreeable and beneficial by modifying the temperature of the water. It would seem to be one of the most natural forms of bath, and is practiced by mankind the world over, as well as by many species of animals. In a state of nature one merely takes a plunge into the river or lake or sea when convenient. But in the civilized home one achieves similar results by complete immersion in the gratefully cool or cold water of the large bathtub.

Cold Plunge

However, by the *plunge* is usually meant the sudden dip or dive into a special water-tight tank, several feet in length and breadth and about 5 or 6 feet in depth. This is not a swimming tank, for usually the length is only about 8 feet and the width about 6 feet. Not many homes have such a tank, of course; but some sanitariums have them, and the reader may sometime be a patron of such an institution. The water

usually ranges from 50 to 70 degrees in temperature, but the colder it is the better. As a rule, the plunge is enjoyed, for the body is often warmed in preparation for the plunge, by Turkish or Russian, shower, needle, or other hot bath or pack. The tank described is not necessary except for greater enjoyment, for the plunge in the full tub will be just as beneficial to the health. For the most part the further discussion of the plunge will refer to the tub plunge.

One advantage of the tub plunge over other forms of bathing, with the exception of swimming, lies in the comfort of shifting to the horizontal position and thus resting the body in general and the internal organs in particular. In the vertical or erect position these organs are suspended, as it were, from the spine; but in the horizontal position the strain incident to this suspension is relieved. Furthermore, when submerged and subjected to the consequent equalizing of pressure on all sides, the effect is similar to that of floating the internal organs in a fluid of density and weight very nearly equal to their own, which cannot be other than restful. Of course, this applies with greater force to the restful and relaxing qualities of the warm and hot baths, discussed elsewhere, for one remains in the cold plunge but a short time at most—from two or three seconds to a minute or two. But the position plus the constricting action upon the skin and the general toning effect of the cold plunge make this bath surprisingly restful and beneficial.

Advantages of Horizontal Position

When possible it is a good plan to fill the bathtub the night before, so that little or no interval elapses between the time of getting out of the warm bed and the beginning of the bath. When ready for the bath, stand by the side of the tub and with both hands bring water vigorously to the face and around the neck, also upon the head if the cold wet turban is not used. From this point there are two distinct methods of proceeding.

In the first method, after the initial wetting of the head, face and neck, quickly scoop up as much water as possible with the right hand and dash it over the left arm and shoulder, taking especial care to reach the armpit. Do the same with the left hand over the right arm and shoulder. Now lean over the tub and rapidly scoop up as much water as possible with both hands, throwing it upon the chest and, at the same time,

slapping the chest vigorously. Now jump into the tub and sit down and rapidly scoop up water over the chest, abdomen and back, at the same time stretching out the legs so that they are entirely covered. If by this time you feel that the bath has continued long enough, pull out the drain plug but stand in the receding cold water while vigorously drying with a coarse towel. If, however, you desire to prolong the bath a little the whole body may be immersed in the cold water for a few seconds in the horizontal position.

Methods of Taking Plunge in Tub

The advantage of standing in the cold water while drying is that the prolonged bath to the feet favors a more powerful reaction, thus bringing the blood in ample quantities to the feet, by which means both feet and legs may be kept in a better condition generally. However, unless the water is only barely cool, many people cannot continue the bath in this manner and secure good reaction. For them it is better to get out of the tub for the drying process. Even then they may require considerable walking or other exercise, in addition to the friction of drying, to bring about the proper reaction; or massage or some form of manipulation may be given. In any case there should be, if possible, half an hour or more of walking after the bath.

The other method of taking the plunge bath, after wetting the face and neck and head, is to plunge into the water suddenly. This may be done by supporting the weight on the hands and feet on the sides of the tub back downward, and then, "letting all holds go," drop into the water, letting the hands descend rapidly so as to reach the bottom of the tub in time to support the body before the head submerges. If one enjoys the "ducking," however, and holds a full breath, there is no reason why the immersion should not be complete, and if the reaction is vigorous, there may be repeated immersions with greater enjoyment and benefit. Rubbing should be quite energetic throughout the bath. In the plunge tank, swimming motions may be made instead of or in addition to rubbing. The suggestions for drying are the same for this plunge as for the other.

Never enter the plunge when chilly. And always get out of the bath during the first reaction. A secondary chill is positively detrimental to health. *Any* cold bath is highly de-

pressing if continued too long, or if reaction is defective. A sudden cold bath such as the plunge causes an intense internal congestion, for which reason a great many people should not take it.

When the general health and vigor are high, the plunge is one of the best of all measures for activating and stimulating the intellectual processes, for the reason that it increases blood pressure, accelerates brain circulation, and stimulates respiratory movements. The other internal organs are also greatly stimulated and their every function aroused. **Health Value of the Cold Plunge**

The types of cases best suited to this bath are those of average health with sedentary work and little exercise, obesity without organic affection, and diabetes when the weight is normal or above or only slightly below normal. There are also other mild disorders in which it may be used. It is an excellent bath to follow the hot-air or hot-vapor bath, also the hot full bath or any other that is markedly heating. But everyone should know his own physical condition before trying the plunge.

POULTICES.—The old-fashioned poultice was used in practically all homes and in most countries up to a generation or so ago and in many homes during the past generation; it is still used to an appreciable though less extent. In fact, many doctors, especially in rural districts, still prescribe it. There are the alum, the bread, the bread-and-milk, the charcoal, the clay, the flaxseed, the linseed, the molasses, and the mustard poultices; also those of carrot, lobelia, yeast, tobacco, and other substances. The writer believes, however, that these messy and inconvenient applications are inferior to hot compresses or fomentations. Poultices are, in fact, compresses made with some ingredient other than plain water. One advantage that they have is that they hold heat for some time; another is that, when made of certain substances, they are locally stimulating to the skin. But the compress covered with flannel and, perhaps, some impervious material (the protected heating compress), or the compress kept hot with the hot-water bottle, will answer every purpose of the poultice and save inconvenience and uncleanliness. Also there will be less likelihood of blistering the skin. See *Fomentations, Heating Compress,* under *Compresses, Mustard Fomentations.* **Poultices**

PROTECTED HEATING COMPRESS.—See *Heating Compress*, under *Compresses*.

RAIN DOUCHE.—See *Shower Bath or Rain Douche*.

REACTION OR RECUPERATION.—Reaction is the term usually employed to designate the phenomena or change in the circulation and heat of the flesh following a bath. It is the opposite of action, the primary effect of an application, and applies to hot applications as well as cold. Recuperation is sometimes used to signify reaction. But while this term means restoration or swinging back to the normal state, it is usually and more properly reserved for application to the general physical state following acute or other illness. The term *reaction*, therefore, is preferable to recuperation, when speaking of the secondary response to hydriatric applications.

Reaction or Recuperation

As will be seen from the general remarks upon the subject of Hydrotherapy and the conditions under which cold baths are beneficial, it is the reaction from the cold bath or application that is the important factor in the invigoration of the body. In some cases it is directly beneficial, as when the general cold application is used in fever, or local ones for the reduction of swelling or acute inflammation; but with the general cold bath, half bath, sitz-bath, etc., if one does not have proper reaction they will weaken instead of strengthen, and it would be far better not to take them.

The symptoms of incomplete reaction vary with the individual and the circumstances of the bath. There may be an almost continuous chill for an hour or two, or even for several hours following the bath. The extremities remain cold, and perhaps the lips are cold also. Headache of a dull character, more or less general, is frequent, also dizziness. Diarrhea sometimes develops, also pains in the abdomen and pelvis, due to internal congestion, which also may give rise to an increase in any catarrhal discharge which then may be from any of the various mucous surfaces. There may be pain in the joints, muscles and nerves, with a feeling of weariness pervading the whole body.

Reaction, Signs of

When lasting chilliness is experienced after a cold bath, such baths should not only be avoided in future until a greater degree of vigor has been built up, but special measures must be taken to produce a satisfactory reaction, even though

a tardy one. While it may be necessary in an occasional case to resort to artificial means of warming the body, such as warm blankets and hot-water bottles, it is usually possible to bring about the reaction from within. This is far better when it can be done, for it means energized nerves and activated muscles and blood vessels; whereas the reaction which is artificially induced is apt to be sluggish at best, and if the heat is not continued long enough there may be an intensified sense of chilliness when it passes away. The only way to insure proper and complete reaction is to increase the natural warmth of the body itself by arousing the heat-making mechanism, and this necessitates an improvement in the circulation, and the nerves governing it. To accomplish this, the one perfect and absolutely satisfactory method is the use of active exercise.

Reaction, Methods of Insuring

One should not try to regain warmth by closing up all windows and spaces for ventilation and shutting off the supply of fresh air, for the more pure air one can breathe under such circumstances, the more quickly will warmth be regained, providing some active means is employed to counteract the cold from the outside. If the room is cold, it will be much better to keep the windows open and put on a little more clothing so that one will not suffer from the chill in the air while endeavoring to regain natural warmth through exercise. Rubbing, of course, is always effective, just as is any other form of massage, since it accelerates the circulation, not only in the parts subjected to the treatment, but throughout the entire body, the extent of the effect depending upon several factors.

Because of anemic and nervous conditions, there are some who are particularly susceptible to cold, and who find that a reasonable amount of exercise does not warm them as it does others. Some, in fact, would have to exercise to the point of exhaustion of nervous energy before they could be satisfactorily warmed after a cold bath; and, of course, their overexertion would make the condition worse than before. The greater one's general and nervous weakness, the greater one's difficulty in this matter. In such cases moderate exercise should be combined with other measures: for instance, the drinking of hot water or hot lemonade, and perhaps the addition of

extra clothing. After taking enough exercise to arouse the circulation appreciably, warming of the feet will be of additional advantage; but, used alone, the latter will usually not be effective. If the case requires unusual means and exercise cannot be taken or depended upon, a hot foot-bath combined with wrapping up well and drinking hot lemonade may be used. When absolutely necessary, a warm full bath, at a little above body temperature and continued until bodily comfort is regained, may be taken. In most cases, however, active and prolonged rubbing with a rough bath towel or brush will bring about perfect reaction without other measures.

Remember that the one essential requirement to insure the greatest benefit from the cold bath is warmth generated spontaneously. It is far better to temper the bath until, through training, this spontaneous reaction, or a reaction from moderate rubbing and exercise, becomes possible, than to resort to external heat. Our natural instincts in this regard must not be outraged. Cold air coming directly in contact with the unclothed body is powerfully stimulating *when the body is able to keep warm;* otherwise it will be debilitating. The best guide is found usually in the hands and feet. Everyone should aim to have the extremities normally warm under all conditions. The circulation will usually be right, if the hands and feet are warm.

Rectal Irrigation, Directions for

Rectal Irrigation.—The rectal irrigation is a form of low enema, but it is usually employed for other purposes than the relief of constipation. There are special return-flow irrigators for giving these treatments, and when obtainable they are better than improvised ones. But the long curved vaginal douche-tip of hard rubber that is provided with the ordinary fountain-syringe outfit serves the purpose excellently. The patient may lie on the back or on the side while taking this irrigation, having a suitable drain arranged, but when one is in fair vigor it is more satisfactory to sit on the toilet seat and allow the water to enter and escape simultaneously. The temperature of the water should be about 102 degrees to begin with, and may be increased up to 125 degrees as tolerance is increased. The height of the gravity flow from the water bag can be regulated according to the individual's comfort.

The hot irrigation should continue for about fifteen min-

utes, which necessitates refilling the container several times, or partially closing the stop-cock on the tubing so as to allow the water to flow more slowly. It is necessary that tone of the rectal tissues, reduced by the hot application, be recovered if harm is to be avoided and permanent good to result. Therefore a small amount of cold water should be used in the same manner after the hot irrigation is completed, unless in an occasional case it is found that cold considerably intensifies any pain that may be present. In such a case the irrigation may be used hot only, for a time; then, when the pain and its causes are reduced, fairly cool water may be used after it. One treatment a day will usually be sufficient, though some cases may require a treatment morning and night for a few days.

Hot and Cold Irrigation

When the cold irrigation is used for acute inflammations, the temperature of the water should be from 40 to 60 degrees, and the duration from five to ten minutes.

Chronic inflammations in the pelvis, such as inflammation of the ovaries or tubes, seminal vesicles or prostate; also leucorrhea, catarrh, irritation and ulcer of the rectum, and spasm of the rectal sphincter muscles—all are greatly benefited by hot rectal irrigations. The acute inflammations of these structures are held in check by the cold rectal irrigation.

The alternate irrigation (hot and cold) may be used with benefit in some cases of constipation due to failure of the rectal nerves to recognize and respond to the presence of waste material after it reaches the rectum. In these cases the irrigation should be only for one-half minute or less for each temperature, repeated two or three or more times at each sitting. One or two of these treatments may be given daily.

Through reflex action the irrigation may empty the entire large bowel and even bring down some of the contents of the small intestine. To accomplish this in one treatment, however, it is necessary to use fairly hot water, or to continue the treatment for at least ten minutes, usually longer; or to use hot water for six or eight minutes, then cold for one or two minutes, then repeat both the hot and the cold. Thus those taking the irrigating treatment for pelvic inflammation of some nature may receive a double benefit—one through the effect upon the inflammation and the other through the effect upon the bowels.

Conditions Benefited by Rectal Irrigation

RUBBING.—See *Friction Bath, Dry; Ice Rub; Oil Rubbing; Shampoo, Dry; Towel Rub, Cold; Wet-Hand Rub; Wet-Sheet Rub;* also *Reaction or Recuperation.*

RUNNING FOOT-BATH.—See *Flowing Foot-Bath,* under *Foot-Baths.*

RUSSIAN BATH.—The Russian bath is taken in the same manner as the Turkish bath except that hot vapor, or steam, is used instead of hot dry air. Indians of North America have used this bath for centuries, though perhaps it would be more correct to say that their sweat bath is a combination of hot air and steam. The bathers sit in a tent made of a willow frame covered with skins and blankets. Several red-hot rocks are placed in this *sudatorium* until thorough sweating of the occupants is induced, additional rocks being brought in at intervals. Toward the end of the bath water is poured over the hot rocks, producing steam. The Indians generally follow this bath with a cold plunge and a rub-down with mud, lying out in the open air exposed to the sun's rays until the body is thoroughly cooled. Compare with the Finnish form of sweat bath, under *Sweat-Bath.*

Russian Bath

In sanitariums and hydriatric institutions using the Russian bath, a special room is prepared with pipes admitting steam. In some of these a shower bath is installed for cold water only, thus giving the bather, if he prefers, an opportunity to take steam baths and cold showers alternately. In other institutions the shower bath or a plunge tank, or some other arrangement for a quick general cold bath, is conveniently arranged; for a following cold bath is an essential part of the Russian bath. The temperature of the steam room varies from 115 to 130 degrees or even higher, but usually is about 120 degrees. It is dangerous to remain in a steam bath at a temperature of over 135 degrees for more than a very short time. Russian baths usually last for from ten to fifteen minutes, sometimes five or ten minutes longer.

Effects of Russian Bath

The general effects of this bath are about the same as of the Turkish or hot-air bath, and it has about the same contra-indications. In all cases of chronic rheumatism and uricacidemia the steam bath is exceedingly useful. It also affords great temporary relief in cases of acute bronchial catarrh (acute bronchial cold), and, if the cooling-off is accomplished

properly, the relief may be permanent. This requires that the cooling be prolonged, not sudden. Other conditions in which this bath is of value are diabetes uncomplicated with heart disease or heart weakness, general toxemia, and some skin diseases. Both the Russian and Turkish bath are sometimes used in the treatment of obesity, in lupus, syphilis and chronic alcoholism. The Russian bath is not so enervating as the Turkish bath, and, as a rule, can be taken occasionally with benefit by those who are below normal weight. One objection to the vapor bath not noticed in the hot-air bath is embarrassment of breathing when the head is included in the bath, though many people are not affected in this way. There are some other objections to both the Russian and Turkish baths, which are referred to in the discussion of the latter. See *Turkish Bath, Hot Air Cabinet Bath.* This bath should not be used in cases of fever, well-advanced Bright's disease, tuberculosis of the lungs, hardening of the arteries, or heart disease or weakness.

SALINE BATHS.—Sea-water bathing is the natural form of the saline bath. The sea water contains numerous salts, the more important and bountiful ones being sodium chlorid or common salt, and the chlorid and sulphate of magnesium. The total solids or salts in sea water amount to from four to five ounces plus, to the gallon. It is these salts in solution that cause sea bathing to have a stimulating effect upon the skin, and this effect encourages reaction. Because of these effects slightly colder water can be enjoyed when it contains the salts than when ordinary water is used. One can secure effects practically the same as those from sea bathing by merely adding from five to eight pounds of table salt to the thirty-gallon tub of ordinary water. But the sea bath may be more nearly approximated by adding to the same amount of water seven pounds of salt, one pound of magnesium chlorid, and half a pound of magnesium sulphate. If still greater stimulation of the skin is desired, it may be secured by the further addition of about three-quarters of a pound of chlorid of calcium (not chlorid of lime!). Local applications may be made more stimulating by adding salt to the water employed, in the proportion of one-quarter pound to the quart. Cold friction with a scrubbing brush given with such salted water is even

Saline Baths

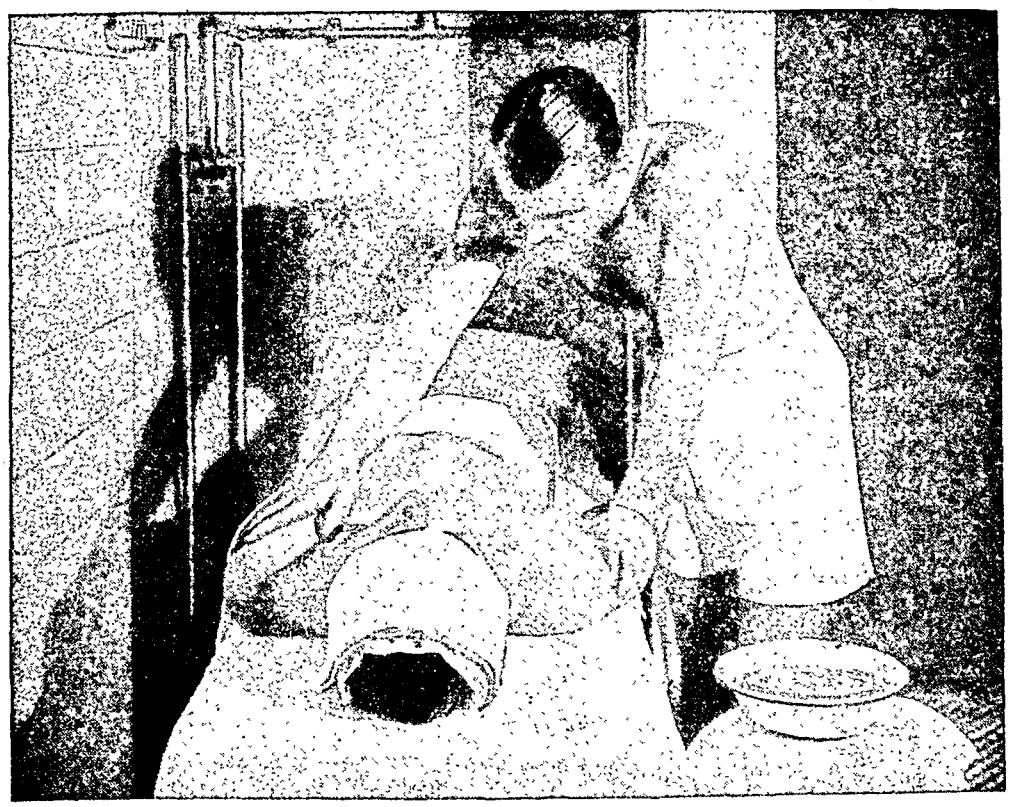
more stimulating than friction with fresh water, a lower temperature also being permissible, thus increasing the tonic effect of the bath.

Salt Glow

SALT GLOW.—This is an excellent application to produce marked circulatory reaction. The chemically irritating effect of the salt, plus the mechanical stimulating effect of the salt granules upon the skin, brings about a much more intense circulatory reaction than do the saline baths, the sea bath, or the effervescent bath. Little thermic reaction is produced, however, with the usual salt glow, which is given with salt only slightly below the temperature of the body. But if very cold water is used to moisten the salt, a very powerful thermic as well as circulatory reaction will be produced.

Manner of Giving Salt Glow

For the salt glow two or three pounds of salt, fairly fine, are placed in a basin conveniently near, and slightly moistened with water. The patient may be either sitting or lying down on a protected bed or couch, but it is better for him to stand upon a low stool. When reclining, the patient's body



The salt glow requires two or three pounds of salt, fairly fine, which is slightly moistened and placed in a basin nearby.

should be covered with a sheet, which should be removed from only the part being frictioned. This precaution is not necessary if the patient is standing, though care should be taken to have the room sufficiently warm. It is well, in this case, for the patient to stand in a foot-tub containing three or four inches of water at a temperature of from 102 to 106 degrees. The patient is rubbed down with the hands containing the moistened salt, beginning with the chest and arms and proceeding over the body as described in *Wet-Hand Rub*. The vigor of the rubbing will depend largely upon the patient's temperament and his sensations, which should be taken into consideration by the attendant. Brunettes endure more friction than blondes, because their skin is thicker and less easily irritated or injured. The bath should be completed by a cold dash, pour or spray, but, for feeble patients, there should be a quick warm or hot shower or other bath before the cold application.

This measure is a very excellent tonic, of particular benefit for weak and feeble patients who have little body heat and who react poorly to cold or cool baths. The salt glow should not be given in cases of eczema or other skin disease, nor frequently or vigorously enough to produce skin irritation. It is a tonic, bracing bath for health or for chronic disorders, especially chronic indigestion, but not, as a rule, for acute disorders.

Salt Glow, Benefits of

SAND-BATH.—One form of sand-bath is much like the dry pack, so far as effect is concerned. In this the patient is enveloped in hot dry sand, the temperature of the sand being from 116 to 122 degrees. See *Dry Pack* for effects.

The other form is more like the salt glow, the sand being used for frictioning the surface of the body. It is said that the women of the Arabian desert, because of the scarcity of water, bathe regularly in sand. They are reputed to have extremely velvety skins. However, the sand used must be round sand, such as is found only in certain localities or on sea beaches where the waves and tides roll the sands about and thus remove the sharp edges. Probably few people need sand baths of this kind, but the dry sand pack mentioned above is very comforting and beneficial. When bathing at water resorts, portions of the body may be given the sand bath.

Sand-bathing

SCOTCH DOUCHE.—The Scotch douche is not a special form of douche, but a special manner of taking any form of douche. It consists merely in the application of hot water for a comparatively long time, that is, from one to four minutes, followed immediately by a cold application of short duration, that is from three or four to thirty seconds. The Scotch douche may be given generally or locally, by the horizontal jet, the fan spray, the shower bath, or any other form of stream. This is an excellent treatment following some form of sweating procedure, such as the prolonged hot shower, or the Russian, Turkish, electric-light or vapor bath. The bath (including both the hot and the cold application) is excellent in many cases of rheumatism, gout, sciatica, neuralgia, dropsy, obesity and general toxemia, in which cases the best effects are procurable when it follows a sweating bath. It is not suitable, however, for any of these conditions when they are associated with heart weakness or disease. It is very good in feeble cases, also in those cases where sweating is profuse and frequent, often due to a relaxed skin. Weak or paralyzed muscles are very much benefited by the combination hot and cold application, or Scotch douche. When given locally, this douche is of excellent service in sciatica, neuralgia of the intestines or stomach, ovaries, or uterus, or of the intercostal nerves, ulcer of the stomach, general irritation of the spine, chronic backache, and lumbago.

Scotch Douche

SEA BATHING.—See *Open-Air Bathing*.

SHALLOW BATH.—This bath, as its name implies, is taken in a tub only partially filled with water. The depth of the water usually is about six inches, but may be as low as four inches. When deeper than six inches it interferes with the necessary rubbing. Besides the tub of water at proper temperature, a sheet, plenty of towels and a large handled dipper should be conveniently near.

The Shallow Bath

The patient should be thoroughly warm before the bath, though preferably not perspiring. The warmth may be assured by preparatory exercise, or by hot-water bags or other applications in bed, or by a warm full bath. There should be a turban about the patient's head, wrung from water at 58 to 60 degrees. He seats himself in the tub, extends the legs until straight, then begins at once a vigorous rubbing of his

arms, chest and abdomen, while an attendant rubs his back and sides with both hands. This procedure lasts only twenty seconds. For the next ten seconds the attendant dips water from the tub and dashes it upon the back of the patient, and for the next twenty seconds the rubbing is repeated. The patient then lies down in the tub with just the head above water, the attendant rubbing his legs for the ten seconds this continues. So far the bath has occupied just one minute. If it is to occupy two minutes the foregoing procedure is repeated once; if three minutes it is repeated twice. All parts of the bath are important, and during all parts of it there should be vigorous rubbing.

The bath is used as a tonic procedure, also to reduce fever. For the former the water temperature should be from 65 to 75 degrees, the bath continuing from one to three minutes (from one to three procedures as described above). For reducing fever the temperature is from 70 to 85 degrees, the bath lasting from five to fifteen minutes. It is important that the temperature be accurately adjusted for if it is too low there will be little or no reaction, the internal congestion will continue, and the tonic effects of the bath will be lost. If it is too high the final effect upon the skin will be to produce an anemic, relaxed condition.

Uses of the Shallow Bath as a Tonic

The bath is more beneficial if one attendant rubs the back and sides while another rubs the legs, but a fairly vigorous person can take it effectively alone, the back being rubbed by sawing a cold wet towel up and down and from side to side for the length of time required. When taken in this manner it is a very invigorating daily bath for those who are healthy, and can be taken with advantage instead of the cold shower or cold full bath.

The effects of the shallow bath are very similar to those of the douche, but less pronounced. When the latter is not available the shallow bath may be used as a substitute, it being a very efficient and powerful tonic measure, favorably influencing the general vital resistance, increasing the vital nutritional efficiency, often the hemoglobin and red blood cell, and hence the muscular capacity for activity. Its favorable effect upon the circulation makes it particularly beneficial in most chronic conditions with which are associated disorders of the skin, and

also in the majority of the infectious fevers. When there is skin anemia, the water temperature usually should be from 60 to 75 degrees, the bath to continue for one or two minutes.

Effects of Shallow Bath

In the case of patients who are feeble or irritable, it should continue only a quarter to half a minute for the first few applications. The shallow bath may further be used instead of the Brand bath to lower temperature; following a sweating bath, as the tonic part of the treatment, and especially if the heating procedure has left the patient weakened and depressed; in many cases of heart weakness, and of asthmatic troubles; in neurasthenia, nervous dyspepsia, constipation, diabetes, reduced gastric acidity, uric-acid diathesis and troubles due to uric acid, providing there is no pronounced pain.



The standing shallow bath is shown above. The patient stands in a tub containing about 6 inches of water at a temperature of 75 to 80 degrees. The water is poured over the spine, chest, and shoulders, while the attendant applies vigorous friction to various parts of the body.

The shallow bath is essentially a cold bath, though it may also be taken hot, in which case it is excellent for pains in the pelvis, neuralgic pains down the front or back of the thigh, and many cases of rheumatic leg-joint pains. But it must not be used in acute congestion or inflammation or suppurating processes in the pelvis, nor in abnormal menstrual flow due to uterine fibroid or pelvic cancer, and, when there is much tenderness, the rubbing should not be too vigorous or too prolonged. Other conditions in which the shallow bath is to be avoided

Precautions in Using Shallow Bath

are inflammation of the stomach, intestines, peritoneum, bladder, prostate, ovary, tubes, or kidneys, and chronic congestion of the brain or spinal cord.

The *half bath* is a modification of the shallow bath. See *Half Bath,* in its alphabetical position in this section.

The *standing shallow bath* is a further modification of the shallow bath. This is taken with the patient standing in a tub containing about six inches of water at a temperature of from 75 to 80 degrees. The water is poured over the spine, chest and shoulders every fifteen to twenty seconds, and an attendant on each side applies vigorous friction, especially to the legs, to which water is constantly carried by the attendants' hands. This procedure continues for from one to three minutes. The bath is concluded by pouring over the patient a pailful of water at a temperature of from 55 to 65 degrees. This insures or encourages vigorous reaction, especially when the colder temperatures are used. After this the patient is dried quickly and rubbed briskly. After the patient has been dressed, moderate exercise should then be taken, out of doors if possible, until reaction is completed.

The Standing Shallow Bath

The best time for giving the standing shallow bath is when the body is thoroughly warm in the morning after a good night's sleep. But as with the shallow bath, the standing shallow may be taken after any heating bath.

SHALLOW FOOT-BATH.—See under *Foot-Baths.*

SHAMPOO, DRY.—This refers to a method of dry frictioning of the body, not to treatment of the hair and scalp. It consists merely of surface friction to the whole body with a flesh-brush, coarse friction mitt, or special hair glove. The friction is given with little pressure, the strokes being short and rapid, and has the effect of improving circulatory reaction, with little if any influence on the body temperature. Habitually cold, or thick, inactive skins are much benefited by it. Treatment vigorous enough to produce anything more than temporary redness is detrimental. This bath is an excellent procedure to start the day with, before patients arise from bed. It is particularly useful for those who have an aversion to water applications, also for use alternately with water applications.

The Dry Shampoo

SHEET, DRIPPING.—See *Dripping Sheet.*

SHOWER BATH OR RAIN DOUCHE.—This is one of the most popular modern forms of bathing, and needs little explanation. The water is conveyed to a perforated disc placed at some distance above the standing height of the bather. This disc breaks up the column of water into a number of moderately fine streams which descend like rain, hence the name *shower* or *rain bath*. The same effect may be produced by a movable or portable hand jet, this being called a *hand spray*. The disc may also be placed so as to spray upward, beneath a seat, when it is called an *ascending spray*. The disc for the shower bath usually has openings more numerous and larger than those in the hand spray, the disc also being larger. In comparatively recent years the overhead shower disc has been placed at an angle, either in the wall or on a vertical water pipe, as well as directly overhead. This makes it somewhat easier to concentrate the water at some lower portion of the body, also to keep the head dry if desired.

Shower Bath (Rain Douche)

The shower bath has the advantage of requiring much less water than the tub to accomplish the same results. Its particular advantage over the tub bath, however, is that one is always using clean water, whereas in the tub one uses the same water over and over until the bath is completed. And many otherwise fastidious people complete their tub baths without rinsing from their bodies the water which bathed them free from dirt and perspiration, apparently not realizing that as the water drains from the tub (in which they usually remain seated during part or all of the draining) the floating body oil, dirt and perspiration on top of the water are attracted to and adhere to their bodies. Of course, the towel removes this, or most of it; but the point is that they are not using clean water and that the towel is obliged to do what the bath water should do. With the shower bath this clinging to the body of once-removed dirt is impossible; new water is used throughout the bath, and its force and downward flow carry the dirt with it. One usually feels cleaner as well as more invigorated after a shower bath than after a tub bath.

Advantages of Shower Bath

The same general principles apply in using the shower bath as in the use of the horizontal douche. The quantity of water falling steadily upon the bather and the amount of body surface reached by it are greater than with the horizontal jet;

hence the cold shower is a somewhat more vigorous treatment than the horizontal jet. But because the pressure is less the mechanical effect is less, which will make the reaction less prompt. For this reason those of low vitality must use, or have used for them, all necessary precautions to insure perfect reaction after the shower bath.

Because of the pronounced effect upon the heart and brain through stimulation of the skin on the shoulders and upper part of the trunk, it is best that the shower disc be placed not more than two or three feet above the bather's head, whether hot or cold water is used. The heart is often powerfully excited, the blood pressure raised and the brain and nervous system are greatly aroused, especially by the cold shower, the first effect of which is almost to inhibit respiration.

The Shower Bath as a Stimulant

Unless one is quite strong and vigorous, it is usually best to begin the shower bath by allowing the water to fall upon the feet first, holding first one foot and then the other to receive the falling water; then the hands, arms, shoulders, and back should be showered, and finally the chest and abdomen. This is particularly preferable when the cold shower is taken by or given to "cold-blooded" people or those considerably below normal in vigor. In cases of low vitality, the head should be covered with a thick turban or rubber bathing cap, but this is an unnecessary precaution when the bath is used as a hygienic, tonic measure by those of ordinary vigor. One should keep in active motion during the bath, rubbing the body well with the hands and lifting the legs one at a time. The chest especially should be rubbed vigorously, though at the first contact of the cold water with this part the hands should be held over it to protect its contained organs from too great shock. The duration of the bath depends upon its temperature and the condition of the bather; but it should rarely continue longer than from one to three minutes.

The *cold shower* is very exhilarating and bracing. Some find it more rigorous and more difficult to secure reaction from than the cold plunge of very short duration with water at the same temperature; but it usually takes less time to get into and out of it, and it is, altogether, a most satisfying procedure. For the athlete, who requires merely a quick rinsing off after his exertions on the track or field or in the gym-

The Cold Shower

nasium, it is to be preferred to any other bath, though in a great many cases it is best first to rinse with warm water for a minute or two, then take the cold shower. In other cases, where the body is not first heated by exercise, some form of heating is usually necessary before the shower, except perhaps in summer. A shower of from 100 to 104 degrees for from one to three minutes will prepare the body for the cold shower, and because both may be accomplished by means of the same apparatus, this is a particularly convenient form of bath.

The cold shower is particularly beneficial for people who are anemic, yet moderately vigorous; also for people who are full-blooded to excess, and over-fat people who have no heart weakness. But in these cases it should follow some heating or moderate sweating procedure. In anemias associated with considerable loss of flesh the moderately cold shower of not over half a minute will produce a favorable degree of stimulation. It will have the same beneficial effect with neurasthenics and dyspeptics, but if the neurasthenic be of normal weight and full-blooded it may continue for from one to two minutes. This duration is beneficial, also, for those who live sedentary lives, for many obese persons, and after sweat baths when it is desired to prevent prolonged sweating afterward.

Those with low vitality should not use the cold shower bath except under skilled advice. Its habitual use by adults, youths and maidens, boys and girls, as a daily hygienic measure for preserving and increasing the vital force, is highly commendable, provided average health exists; but it should be taken quickly, the body should be warm before beginning it, and should be perfectly dried and clothed as soon as possible afterward. Moderate exercise immediately after dressing, or in the nude before dressing, especially if there is fresh air, will increase the benefits of this bath.

The Cool Shower Bath

The *cool shower* bath (65 to 76 degrees) is excellent for those who cannot react to low temperatures, or have an honest aversion to them. By this means they may be trained to endure the cold shower or other cold bath, and secure proper reaction and pleasure from it. After a sweating procedure the cool shower is a favorable bath for cooling off. Often it is as soothing as the neutral shower

The *neutral shower* (92 to 97 degrees) is a very soothing and calming bath, being similar in effect to the neutral full bath but more prompt in its action. Its duration is usually from three to five minutes. Hence many people who dislike the long neutral immersion bath, yet who need its benefits, prefer this shorter bath, though it does not permit of the same relaxation as does the immersion. It is excellent for the relief of sleeplessness due to general nervous or cerebral irritation. For this effect there should be only a gentle shower, and for half the time the spray should be concentrated upon the back and legs.

The Neutral Shower

The *hot shower* bath (100 to 112 degrees) is a powerful excitant to the brain and heart. It should not continue longer than two minutes, often not longer than half a minute. The best use for this bath is to prepare the skin for the cold shower. The head is *not* held under the hot spray; instead, it should be protected with a very cold turban or a rubber bath-cap.

The Hot Shower Bath

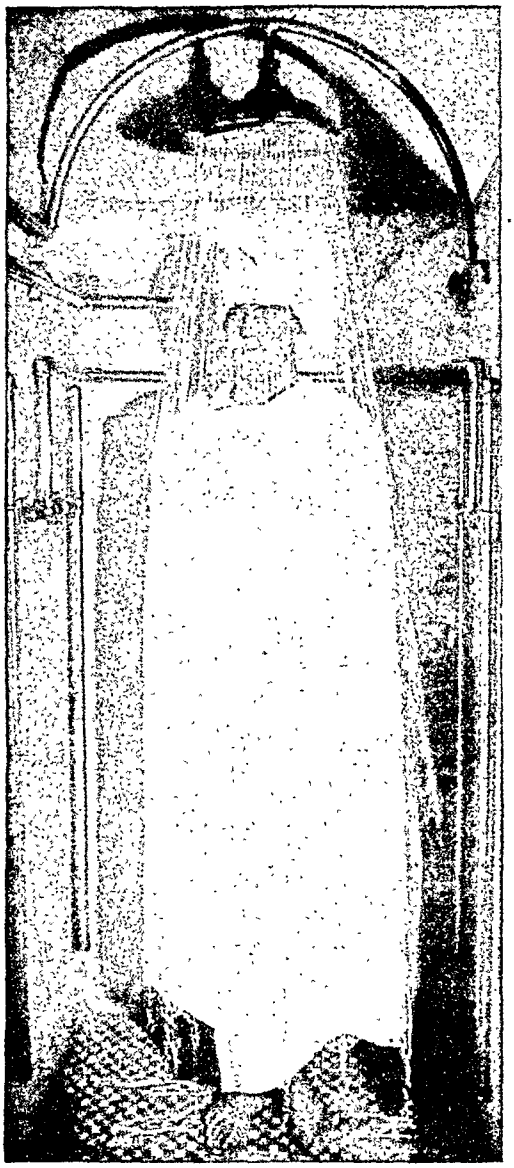
Sometimes the shower apparatus has discs for the horizontal rain douche or spray, with perhaps other discs on one, two, three or four sides. These discs send sprays horizontally or diagonally to the chest, abdomen, groin and thighs, or the corresponding regions, when the back or side is turned to the spray. They give a more stimulating bath than does the ordinary shower, if the water force is considerable or the temperature comparatively low or high. This spray is sometimes erroneously called a Needle bath. See *Needle Bath.* The *ascending douche* is described under *Anal Douche.*

Numerous up-to-date bathrooms are equipped with a thoroughly satisfactory shower apparatus over the bathtub. These are arranged to use either hot or cold water, or water tempered to any desired degree. The tub serves as the receptacle and drain, and a curtain hung from a large metal ring or oval above prevents any splash outside the tub. Even if these appliances are not "built-in" they can be fitted to practically any tub. They are obtainable at plumbing and hardware stores, in many different styles.

The Ascending Douche

A shower-bath equipment can quite easily be fitted up in houses not provided with modern bathing convenience. A common garden sprinkler will do fairly well when suspended overhead and tipped when ready for use by means of a cord

Shower-bath Equipment



Cold Shower Pack

The standing shower pack requires an adjustment of the sheet similar to that used in the reclining shower pack. The towel wound about the head retains the moisture, while water of the proper temperature flows over the patient for a length of time suited to the condition involved. The lowest temperature which will give a satisfactory reaction should be used.

tied to the bottom and passing up over a pulley and then down to the hand of the bather. The portable hand spray, for attachment to any faucet, also is useful for this purpose.

SHOWER PACK, COLD.—This is a procedure for controlling the body temperature almost as effectively as by the Brand bath. First the patient reclines or is laid upon a sheet wrung from cold or cool water, which is wrapped about him so as to come in contact with all parts of the body as in the wet-sheet pack. But instead of renewing the sheet or rewringing it out of water it is merely opened and sprinkled, together with the body of the patient, with cold water by means of a sprinkling can, the patient turning so that the entire body is treated. A better arrangement is to have the head of the bed or couch elevated somewhat, with some waterproof material beneath the patient arranged so that the water will run off into a suitable vessel at the foot of the support. The water is used at a temperature of 60 to 65 degrees; but if the patient has difficulty in properly reacting from such a temperature, or if he has a genuine aversion to cold baths, it may be raised to 70 to 85 degrees, the bath continuing relatively longer. The lowest possible temperature

which will give a satisfactory reaction should be employed. The procedure is excellent in cases of typhoid and malarial fever. When the fever remains quite high and does not respond to less powerful measures, the shower pack is especially helpful. It is almost as powerful a procedure as the Brand bath, and the contraindications are the same.

Simultaneous Douche, Its Forms

SIMULTANEOUS DOUCHE.—In this procedure a douche of one temperature is given to one part of the body while a douche of another temperature is given to another part. The simplest form of this bath is the application of a cold horizontal jet to different parts of the body while a warm or hot shower bath is being taken. Different parts should be extended beyond the area of the shower to receive the cold douche until the entire body has been treated. This is an especially beneficial procedure for neurasthenics who dislike cold water and who have chilly sensations, general or local. The cold applications should continue only from three to six seconds, though the body may be gone over



The shower pack here shown requires the assistance of an attendant, who administers the shower and turns or directs the turning of the patient so that the entire body is treated.

twice or three times if especially stimulating effects are desired. Those sensitive to cold baths may be trained by this method to respond well to them.

Special forms of this measure may be mentioned. A hot douche given to the abdomen while a cold douche is given to the dorsal spine is especially good in catarrhal and congestive conditions of the digestive organs, liver, spleen and kidneys, or prolapse of the abdominal organs. In these cases the applications should continue not less than five minutes, and from this up to fifteen minutes. A hot douche to the lower abdomen, while a cold douche to the lumbar spine and sacrum is given, is very beneficial in pelvic disturbances in which there are no acute inflammatory or pus-forming conditions. In general neurasthenia a cold spinal douche together with a hot foot douche will be stimulating yet comfortably borne. A hot douche to an affected member while the corresponding member of the other side receives a cold douche often improves nutrition and relieves unnatural sensitiveness of this member. Such abnormal sensitiveness, and other abnormal sensations, are quite common in hysterical subjects.

SIPHON HOT-WATER BAG.—This is a specially constructed bag designed for the continuous application of either heat or cold. A large rubber douche bag may be used for the siphon bag, although it may not be quite as satisfactory as special metal, enamel, or glass irrigating jars which are on the market. The treatment bag, which is to be placed upon the part affected, may be made from a section of a large inner tube for an automobile tire. Connections between the two sides should be made at two or three points to prevent too much bulging of the distended section of inner tube. A length of rubber tubing is inserted into each end of this treatment bag and the ends of the bag tied down tightly upon these tubings to prevent leakage. The further end of one of these tubes is attached to the siphon bag while the free end of the other tube is so arranged as to allow drainage into a basin or tub at the bedside. A cut-off may be attached to the latter tube between the treatment bag and the tub to control the speed of the flow. A string tied about the tube may answer the same purpose, it being tightened or loosened according to the volume and rapidity of the flow through the tube. With the

The Siphon Hot-water Bag

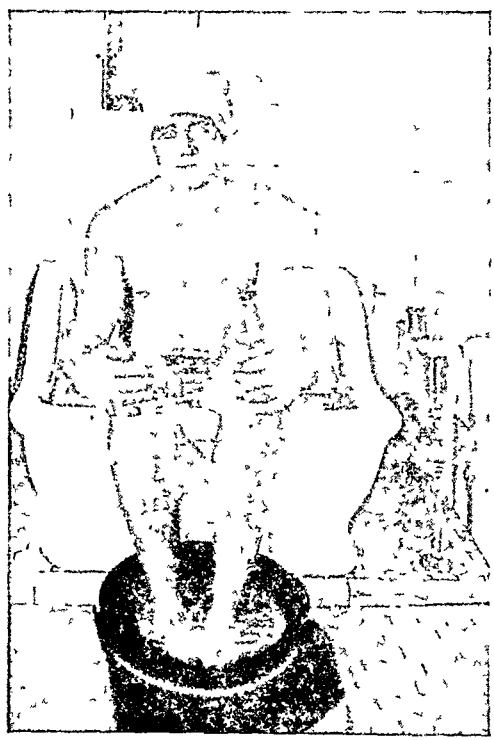
siphon bag filled with water at desired temperature and properly suspended, the treatment bag is applied to the part to receive the application, and thus a continuous flow of water in the bag over the affected part may be secured. Bags may be made to fit any part of the body, even a long bag to be applied to the entire length of the spine. The effects of heat and cold have been discussed elsewhere. and are the same when secured by the prolonged application by the siphon bag as by any other procedure.

SITTING BATH.—There is no bath that universally or generally receives the designation *sitting bath,* yet one sees this bath referred to at times. The half-bath and the shallow bath are both sitting baths. So is the sitz-bath, though in the sitting bath as generally understood the legs are extended, hence the sitz-bath cannot properly be called a "sitting bath." The full bath may be taken part of the time in a sitting position, as may the Brand bath; but these are not definitely sitting baths, as understood by this term. See *Half-Bath;* also *Shallow Bath* under Foot-Bath.

The Sitting Bath

SITZ-BATH.—This is one of the oldest of hydrotherapeutic measures, and one of the most useful. A number of homes are now equipped with the sitz bathtub in the bathroom. But where such an appliance is not installed and yet is needed, an ordinary bathtub, or the portable sitz bathtub (obtainable at or through a hardware dealer or from one of the large mail-order houses), may be used.

The tub should allow of water deep enough to cover



The Sitz-bath

In sanitariums, sitz-baths are frequently placed side by side, permitting the use of hot or cold sitz-baths, alternately. This illustration shows the sitz-bath in use in conjunction with a foot-tub.

or closely approach the navel; and where possible one should have an abundant supply of hot and cold water, so that the temperature of the bath may be adjusted as required, from very cold to very hot. Only the hips are immersed in the water; the knees being flexed are entirely out of it, and the feet are placed, preferably, in a small vessel outside the sitz tub. When the bath is taken in the regular bathtub the feet may be placed up on one end, or may rest on the sides of the tub, or they may be on a stool resting in the tub, while the hips rest on the bottom of the tub. In this case the feet are not in water at all unless the sitz-bath is hot or fairly warm.

A very desirable form of general bath may be obtained by rubbing the body with the hands, or with a towel or flesh-brush, wet in the bath water, while sitting in the sitz-bath. This is an especially agreeable bath when it is taken cold.

Cold Sitz-Bath.—The temperature of this bath as a rule will be from 55 to 65 degrees, rarely colder. The duration will be from one minute to fifteen minutes. In cold or cool weather it is best for most people to have the feet in hot water during the cold sitz-bath, or on hot-water bags, or wrapped in warm blankets. Weak or feeble patients should avoid the cold sitz-bath as a rule, unless their feet are kept warm by one of these means. Heart weakness or disease also contraindicates its use. Care must be taken in all cases that the feet are not so low as to cause compression back of the knees over the edge of the sitz tub. The feet may be in an elevated basin or on a stool, if the individual is so short that there will be compression without foot elevation.

Duration of Cold Sitz-bath

The cold sitz-bath is invigorating to a pronounced degree, having a profound effect upon all functions. Its chief effects are upon the organs of the pelvis and lower abdomen, through its influence upon the cutaneous nerves associated with these organs. Hence the organs of reproduction especially are influenced, but also the spinal cord and the brain. It is a powerful stimulant of brain activity, and as a tonic measure for healthy men and women its daily use is highly advantageous. When suitable clothing is worn it can be taken without disrobing. Man's costume allows him to take this bath without inconvenience, so that it can, if desired, be administered at

Influence of Cold Sitz

noon, which is one of the best times for the cold sitz. Woman's dress today is so simple that it may be removed and donned again without inconvenience or loss of much time. The effect of the cold sitz-bath is tonic to a high degree, and unless too prolonged almost always beneficial. A cold wet turban should be worn during this bath, except by the very vigorous.

In atonic conditions and chronic congestion of the sexual organs or bladder in either sex, the cold sitz is extremely beneficial. The temperature in many of these cases should not be below 70 degrees. Atonic and most other forms of constipation will be greatly benefited by the bath. See *Snow Baths.* Congestion of the liver and spleen and of the brain, in persons of fair strength, will be aided by the bath, which is valuable also in gleet and seminal weakness, also in bed-wetting in young children. Other conditions in which the cold sitz-bath has proved to be of value are pelvic cancer, chancroid, bleeding from the kidney, bladder, urethra, and uterus; hemorrhoids, prolapse of the rectum, and in convalescence from intestinal diseases; vaginitis, dysmenorrhea (taken between periods), nymphomania; hydrocele, varicocele, impotence, prematurity, seminal losses, lack of sexual desire, priapism, satyriasis; and in chronic alcoholism. Combined with a cold wet turban to the head and a hot foot-bath, they are of value also in cases of cerebral congestion. But acute pelvic conditions and those associated with much pain should not be treated by the cold sitz-bath alone. For these see *Hot Sitz-Bath,* and *Alternate Hot and Cold Sitz-Bath.*

Indications for Cold Sitz-bath

Flowing Cold Sitz-Bath.—This is a sitz-bath taken in the ordinary sitz manner with the cold water coming into the tub constantly during the bath, to maintain the required temperature, the excess water either flowing out of the overflow outlet or through the partially opened drain, or through another suitably placed opening. Since the water abstracts heat from the body the water temperature will gradually rise as one remains in the bath if this is not prevented by the constant addition of water at the desired temperature. There is no advantage in the flowing cold sitz other than greater assurance of the effects expected from the ordinary cold sitz-bath.

Flowing Cold Sitz-bath

The prolonged cold sitz-bath is an ordinary cold sitz-bath continued for from one-quarter to three-quarters of an hour,

the temperature being, usually, about 75 degrees, though a temperature of 65 degrees is often better. A hot foot-bath is necessary during this bath. Sometimes it is better to begin the bath at a reasonably high temperature (about 85 degrees or even slightly above), lowering it after three minutes or so to the desired temperature. The pelvic circulation is profoundly affected by this bath, especially if the immersed parts are thoroughly frictioned occasionally, though the hot foot-bath usually takes the place of the frictioning. Additional cold water must be added from time to time to the sitz-bath and hot water to the foot-bath to maintain the desired temperature.

Prolonged Cold Sitz-bath

The cold sitz-bath is of great benefit in all cases of chronic congestion or chronic inflammations of the pelvic and abdominal organs in which pain is not prominent. Following a hot vaginal douche it is one of the most satisfactory of all procedures in pelvic congestion. In chronic prolonged menstruation (menorrhagia) not due to tumor growths within the uterus, it is excellent. In painful conditions of the pelvic organs, an excellent treatment is a ten-second dip into a cold sitz-bath immediately after a very hot sitz-bath of about twice this duration. In acute inflammations of the pelvic or abdominal viscera, in spasmodic conditions of these organs, or in most disorders associated with pain, the cold sitz, either brief or prolonged, should not be used. In case of frequent seminal emissions, especially when there is pain or sensitiveness in or about the prostate or deep urethra, such baths should also be avoided. However, a sitz-bath at a temperature of 75 degrees, gradually reduced from 85 degrees and continued for from ten to twenty minutes, will usually be helpful in these cases.

Uses for Cold Sitz

Rubbing Cold Sitz-bath

Rubbing Cold Sitz-Bath.—This is a powerful tonic measure, having particular influence upon the pelvic organs. The patient has a cold wet turban about the head before beginning the bath and retains it during its progress. He sits in the sitz-bath after first stepping into the hot foot-bath. The bath continues for from two to four minutes, at a temperature as low as 55 degrees (up to 65 degrees), while the patient vigorously rubs his own abdomen and thighs and an attendant rubs his sides and back, using special mitts for the purpose if

obtainable. Higher temperatures may be used for those who react poorly to cold baths, while in need of their tonic effects; but the temperature should be lowered daily until the proper temperature can be taken.

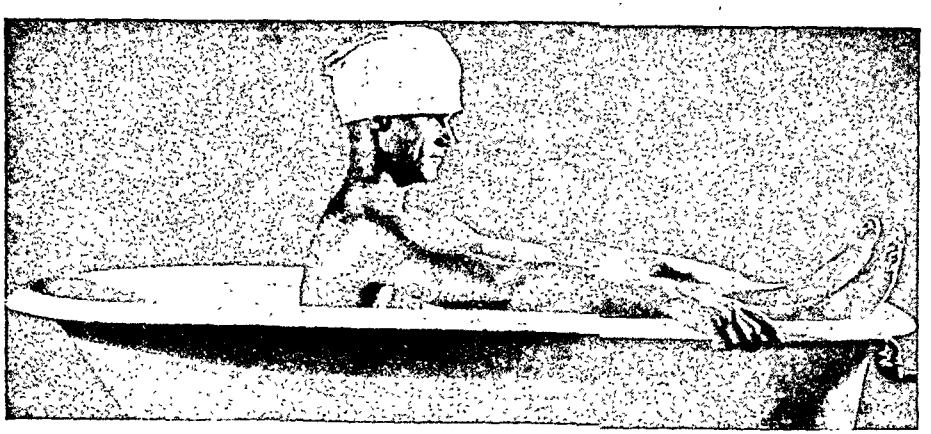
Rubbing Cold Sitz-bath, Uses of

This is an excellent bath procedure for use in cases of weakness or atony of the pelvic and abdominal organs, indicated in such conditions as constipation, displacement of any of these organs, impotence, sterility, incontinence of urine, and bed-wetting in children (or others, for that matter). It should not be employed in cases of acute congestion or inflammation of the pelvic or abdominal organs, including the external genitals of the male; but if it is preceded by a hot sitz-bath, painful conditions of these organs not associated with inflammation will be benefited by the cold or rubbing cold sitz-bath.

Hot Sitz-Bath.—This is invaluable for many affections, having a relaxing effect, relieving pain and inflammation, and remarkably accelerating the circulation locally. The bath should begin at about 100 degrees and be rapidly raised in temperature until from 105 to 118 or 120 degrees are reached. A foot-bath of the same temperature is taken at the same time, the bath to continue for from two to ten minutes. For best results it should be followed by a brief cold sitz or application.

Hot Sitz-bath

See *Hot Full Bath* under *Full Baths or Immersion Baths* for general effects of this bath, since these are similar in



The sitz-bath may be taken in a regular bath tub, as here shown, in a portable wash tub, or in a stationary or portable sitz-bath tub. Only the hips are covered with water. The temperature is determined by the purpose of the bath.

the two baths. The specific effects are upon the pelvic organs. The hot sitz-bath is especially valuable in painful spasms of the vagina, anus, neck of the bladder, or uterus; in neuralgia of internal or external sexual organs; to reestablish menstruation suspended because of chilling the body or feet; in sciatica and hemorrhoids; in fact, in all non-inflammatory pelvic and lower abdominal affections associated with pain. It may also be used beneficially in cases of acute congestion of pelvic or abdominal organs, in which case the body should be cooled gradually, care being taken to avoid all chilling. A *very* quick dash or spray may be given quite cold, or a spray at a tepid or temperate degree may be given for three or four minutes. The hot sitz-bath is also used to advantage in bubo, abdominal and pelvic cancer, abdominal colic or cramps, in the general treatment of gangrene, in chordee (given at night), dropsy of the kidney, acute orchitis, prolapse of the rectum, urethral stricture and incontinence, suppression and extravasation of urine.

The Tepid Sitz-bath

The Tepid Sitz-Bath is one with water at a temperature of from 70 to 80 degrees. It is a sedative bath, in effect, to be remained in for from ten to thirty minutes, with moderate rubbing during its progress. For pronounced sedative effects a sitz-bath at a temperature of from 88 to 92 degrees, without rubbing, may be continued for any desirable length of time over half an hour. In case of sleeplessness either of these baths will be helpful. During such a bath the feet do not need to be in a hot bath.

The Neutral Sitz-Bath.—This sitz is taken at a temperature of from 92 to 97 degrees, lasting for from a quarter of an hour to one or two hours, as the case requires. The feet are not in the hot foot-bath during the neutral sitz, and the cold turban is not necessary. The uses for this bath are many,

Uses of Neutral Sitz-bath

and it is particularly beneficial in a variety of disorders, chiefly of the genito-urinary organs of both sexes. It is applicable to all diseases of the pelvis in which inflammatory and painful conditions make the cold sitz-bath inadvisable or totally unsuitable. Among these conditions are acute and subacute inflammations of the uterus, tubes, and ovaries, bladder and urethra; neuralgia and painful spasms of the bladder, rectum, or vagina; neuralgia of the testicles and spermatic cord; ir-

ritable bladder with frequent urination; prolapse of abdominal organs with nervous uneasiness within the abdomen; spermatorrhea (especially when due to irritation of the sexual center of the spine); frequent seminal losses; excessive sexual desire in either sex; priapism and strangulated hernia.

The Alternate Hot and Cold Sitz.—This, as its name implies, requires two tubs: one filled with hot water, the other with cold. The bath is sometimes called the *revulsive sitz,* but this term properly belongs to another form of sitz—the hot sitz followed immediately (while rising from the bath) with a cold pour to the hips. The alternate sitz-bath begins with a hot sitz-bath, in water at from 102 to 105 degrees. The patient sits in this bath for two to six minutes, then changes to the other tub containing water at from 55 to 65 degrees for from fifteen to sixty seconds. The feet are in a foot-tub at a temperature of about 105 degrees during both baths, and a cold turban is about the head. Usually it is preferable to change from the cold sitz-bath back into the hot sitz, then back again into the cold sitz, each to continue somewhat longer than the first similar bath—the second hot sitz two minutes longer, the cold sitz sixty seconds longer. While in the first cold sitz-bath the temperature of the hot sitz should be reestablished, in fact increased; and while in the second hot sitz the temperature of the cold sitz-bath should be lowered. While in the hot sitz-bath it may be rapidly increased in temperature up to 115 or 120 degrees. Rarely will more than two changes be required. The sitz-bath as described above is often called the "two-change sitz,"—twice hot and twice cold. This alternate sitz-bath is a most excellent hydriatric procedure for the relief of pelvic disorders of either women or men which are associated with neuralgias and hypersensitiveness in the organs. It also is excellent in the chronic congestions and inflammations of these organs and those of the abdomen.

Alternate Hot and Cold Sitz-bath

Snow Baths.—It is not to be understood that snow baths taken out of doors are to be recommended for the average man or woman. In fact it might be said that, ordinarily, snow baths are better as a means of testing one's physical condition than of improving it. However, for those who are strong and who have a vigorous circulation, with consequently

The Snow Bath

great recuperative powers, a brief snow bath may be of value as a means of still further promoting hardiness and vigor. Such baths should be taken with caution by those who are strong, and never by those who are weak or feeble or in ill health, or who possess defective circulation.

The effects and benefits of snow baths depend much upon the manner in which they are taken, and perhaps especially upon the temperature of the atmosphere. It is even more important than in the case of other cold baths that one should be thoroughly warm before taking such a bath; but with proper preparation one may react more promptly and vigorously from a brief snow bath than from a cold-water bath, provided reaction to cold water is uniformly prompt and vigorous. The granules or soft flakes of snow prevent such wholesale depression of the skin nerves as is produced by very cold water, which reaches every particle of the skin. Ice-water or very cold water is a distinct shock to the nerves and a severe tax upon the energies of the body, whereas the shock of the snow bath is much less pronounced and the reaction when it occurs is perfect and delightful. For this reason local packing with snow, when available, may be recommended above cold wet packs where short applications are to be given.

One objection to snow baths is that many people become such enthusiasts that they venture out of doors unclothed in an atmosphere many degrees below that of the snow. When the thermometer registers below zero, Fahrenheit, the cold air, much more than the snow, severely taxes the vital energy and the heat-producing mechanism of the body. Unless one is phenomenally vigorous one should not attempt a snow bath under such conditions. Prolonged exposure is not to be desired, either. The essential health-building factor is prompt and vigorous reaction; and when one has secured this, or taken a sufficient exposure to insure it, one should not linger.

Objections to Snow Bath

The snow bath may be taken in one of several ways. Many prefer to lie down in the snow and quickly cover the body with it; others prefer merely to roll over and over in it—in either case terminating the bath within a few seconds. The body should be thoroughly frictioned during or immediately after contact with the snow. Another excellent method of taking the snow bath, one that has true health-building value, is to

bring a large quantity of snow into a reasonably warm bath-room, and there rub the body thoroughly with it, following with hand friction immediately before towel drying. The procedure is much like that of the salt glow; but because of the very low temperature of the bath it is even more invigorating than the salt glow if it is not prolonged to a depressing stage. There is nothing more highly to be recommended than a sitz-bath in snow, in a warm room, the rubbing sitz, of course, being employed. It does not drain the vitality even of one who is not very strong, and for increasing or restoring vigor of the pelvic organs it cannot be surpassed; but it should not last longer than from one to two minutes, as a rule. The reader will understand that in all cases of a very cold bath of any nature, the limits of comfort and pleasure must not be exceeded. If snow bathing in any form or manner is a hardship or punishment, it should be avoided or abandoned.

Manner of Taking Snow Bath

A snow rub corresponds in a measure with a cold sponge or splash bath and may be recommended for the average man or woman as a substitute for a cold-water bath, provided it is taken indoors. We all remember having had, in the course of our childhood play, our faces washed involuntarily with snow; and we recall the exhilaration which we could not help feeling in spite of our unwillingness to be subjected to this treatment. In bathing the entire body with snow we secure the same exhilarating effect generally and constitutionally, as we wake up every inch of the surface of the body, arouse the circulation through every capillary and energize every nerve in the entire organism. It cannot be enjoyed often during the year; but it is well worth trying when there is snow to be had, using the same care as in cold-water bathing—and perhaps considerably more.

Soap and Its Uses.—A soap is a compound of a fatty acid and an alkali. The alkalis in common use are sodium (soda) and potassium (potash). "Hard-water soaps," or "hard soaps," contain the alkali sodium; "soft-water soaps," or "soft soaps," contain potassium. The fat or oil used in each kind of soap may be the same. Coconut oil is the chief oil used, being added to tallow, which is the chief ingredient, but all animal and vegetable fats and oils procurable in quantity are employed in the manufacture of soaps. The nature

Soap and Its Uses

of the fat used markedly affects the consistency and quality of the soap.

The cheaper and commoner soaps, including laundry soaps, usually contain considerable quantities of alkali, which gives them good cleansing qualities but makes them irritating to the skin. Soaps containing glycerin (glycerine soaps), while pleasant to use, usually contain an excess of free alkali, added to maintain their brilliancy. They therefore have a drying effect upon the skin of many people and an irritating effect upon others. A "super-fatted" soap—one made usually by the addition of about one per cent. of lanolin, a preparation of wool fat that overcomes the effect of excessive free alkali and does not become rancid—will prevent these effects upon the skin in most cases. But, of course, much depends upon whether or not the soap is removed from the skin before drying. Super-fatted soaps are the least irritating of all; but there is no soap made that is not irritating to some extent, though those persons with tough, leathery skins may detect no irritation even from the cheapest and poorest qualities.

Ingredients of Soap

The useful property of soaps is that of attacking dirt, grease, and animal débris, partly because of their free alkali, rendering these substances soluble in water and, therefore, readily removable. But the free alkali is not necessary, as soap itself has the same property and in the best soaps it is present in very minute quantities.

Castile soap, or Spanish soap, made in the countries along the Mediterranean, is a hard soap containing olive oil for the fat. It is imitated more than any other, and many of the so-called Castile soaps are made from coconut oil and are not very satisfactory for toilet purposes. Only the white Castile soap is pure, though whiteness does not guarantee purity. Many people prefer that Castile having a mottled appearance. This mottling is due to contaminating streaks of an insoluble iron or other extraneous ingredient, resulting from incomplete purification during manufacture. These contaminations do not add to its cleansing powers, but because of its compact state it does have a stronger cleansing effect than less firm products. Soaps containing olive oil are much superior to those containing animal fats, and are best for general use.

Castile Soap

Pure Castile is one of the least irritating of all soaps; hence it is strongly recommended for babies, as well as for those who have delicate, sensitive skins, subject to irritation or chapping. It is the best for acne and certain other forms of skin disease, and also for cathartic enemas. In the latter case an aqueous solution of moderate strength is employed, but even this is irritating in some sensitive conditions of the rectum and colon. A strong aqueous solution (one part of this soap to four or five of water) is a very helpful and innocent alkali to administer by mouth in case of poisoning by swallowing any of the strong acids.

The second variety of soap used upon the body is soft soap—a soap having a soft consistency, not the cake soap that readily dissolves in soft water. This soap contains potassium and linseed or olive oil with some alcohol, is about the consistency of vaseline but more ropy, and when pure has a brownish-yellow color. The greenish color common in such soaps is due to impurities in the oils used, or to coloring added, for amber is the color of the pure "green" soap. "Green soap" (or "German soap") is used considerably by surgeons for cleansing the operating field of the patient's body prior to an operation, also for cleansing the surgeons' hands, for it is excellent to "cut" grease. It has an unpleasant odor of linseed oil. Such soft soaps are more strongly alkaline than the cake soaps, because of which they are more cleansing but at the same time more irritating. They may cause severe pain when used on sensitive or tender surfaces, especially on an eczematous area, though they are often used in some forms of eczema, the part later being covered with zinc ointment or some other bland substance. "Tincture of green soap" is green soap dissolved in alcohol, with a little oil of lavender, used in certain skin diseases and as a shampoo.

Soft Soap

Medicated soaps contain such substances as carbolic acid, corrosive sublimate, salicylic acid, sulphur, terebene, and tar. Corrosive sublimate (mercuric chlorid), carbolic acid, and tar are the most widely used. It is doubtful if many of these soaps have any very valuable antiseptic properties for the simple reasons that the strength of the medicament employed is usually slight, the solution in water is still weaker, and this weak solution is in contact with the skin for such a short period

Medicated Soaps

of time. But in some soaps the strength of the antiseptic is considerable. These must be used with extreme caution, and it is better not to use them at all without expert advice. However, a good grade of tar soap does have a soothing effect upon the skin, and makes an excellent shampoo. Such substances as boric acid, borax, and witch hazel, often used in soaps, do no harm but they also do no good.

Soap may be regarded as a necessity when the surface of the body is really dirty. It is important to use a good grade, and even the best, purest, and most satisfactory soap may easily be used too often or used improperly. Soap is more valuable for cleansing dirty floors and soiled clothing than for the human epidermis.

One of the chief factors in making the skin smooth, flexible and resistant, and maintaining it in this condition, is the protection afforded it by its own waterproof coating of natural, delicate oils. The removal of too much of the oil or too frequent removal greatly reduces the natural protection of the skin and the natural protection of the body of the skin. For this reason soap should be used moderately; for while the alkali is preparing the dirt for removal it is also removing the natural oil. The result is likely to be a dry and harsh skin, perhaps with tiny cracks into which dirt works its way. Naturally, more soap and more energetic scrubbing, perhaps hotter water, are required to cleanse these cracks of the dirt, which results in making the skin more dry than before, deepening the cracks and aggravating the abnormal condition. Once the skin becomes chapped it is brought back to a normal state with difficulty, particularly if the excessive use of soap or the use of a strongly alkaline soap be continued, though Nature will correct the trouble if left alone—or, in time, in spite of interference. The use of a super-fatted soap when made of vegetable oils, or the rubbing in of olive oil or some other wholesome vegetable fat, will relieve the trouble. A few drops of sweet cream also may be used with benefit.

Skin Differences

We should not forget that the effect of a soap upon a skin depends considerably upon the character of the skin, for some skins naturally can endure a great deal more abuse in the way of strong soaps than can others. Some skins are able to protect themselves against such abuse by secreting

larger quantities of the natural oil than others. Often, however, such skins are not healthy, but merely thick and tough and more or less inelastic, or abnormally oily. Yet the possessors of such skins are prone to say, with utmost conviction and assurance, that plenty of "good soap and water" never hurts anyone. There are many people, however, with such delicate, sensitive skins that the use of even a small amount of soap results in dryness and irritation that may be pronounced. Those who have such tender scarfskin often experience a smarting and itching which upset the entire nervous system, interfere with sleep, and do an amount of harm which is far greater than any good which might have been secured through the cleansing qualities of the soap bath. It should be kept in mind, however, that very often such results are the effect, not of the moderate use of soap but of baths at a too high temperature, continued too long, with no tonic cool or cold bath following, and with inadequate drying after the bath.

One should use only the lather of the soap, preferably a pure vegetable-oil soap. The soap itself should never be rubbed upon the skin except, of course, in the case of the hands. Especially should one with a delicate, easily irritated skin observe this precaution. Care should be taken, also, to rinse the soap (or lather) entirely off the body with clean water, though when a super-fatted soap is used it is often better to leave some of the fat on. This is the "slippery" substance remaining after all evidence of lather has been removed. Many people make one or two other mistakes in using soap: one is to make no attempt to rinse off the soap, merely wiping or mopping the face or body with the towel after the bath; the other is to rinse in the water in which the bath has been taken. In neither case will the soap be entirely removed from the body, and consequently the skin will be likely to become dry and irritated.

Selection of Soap

Mistakes in Using Soap

Under no circumstances should soap be used every day in general bathing, except in cases where one's work is in dust or dirt, as in the manufacture of cement and flour, or in coal dust and smoke. For those whose skins are not particularly delicate the use of a good vegetable-oil soap in warm water perhaps twice a week may be permissible, even desirable, if

there is any doubt as to the efficacy of the daily tonic and friction baths in removing the accumulation of stale perspiration and various impurities eliminated through the pores and coming in contact with the skin from the outside. Such frequent use of soap *should* be required only during the summer, when there is increased perspiration and exposure of the skin to extraneous substances. But owing to our hothouse mode of living and the excessive amount of clothing worn by most people day and night, keeping even the average atonic skin more or less macerated in perspiration and irritated by its own poisonous discharges a great part of the time, it is needed equally by most people in the cool and cold months.

Perfumed Soaps

Manufacturers usually make only a very few soap stocks, but distribute a wide variety of soaps. They take these few stocks and color and perfume and mold and otherwise modify them so that they appear to be different soaps, while in reality they have the same qualities. A small amount of perfume is added to all toilet soaps and is desirable because it removes the unpleasant characteristic soap odor (noted in laundry soaps). The amount of perfume in many soaps is merely sufficient to neutralize this odor and not enough to be detected as a perfume. But so called perfumed soaps, though costing more and bearing fancy names and labels and claims, may be no better than the unscented soaps. There is no objection, however, to using perfumed soap if the perfume has not been added to mask inferior quality.

Use of Soap in Skin Troubles

Remember that soaps are for cleansing the epidermis, nothing more. There is no soap that will cure skin troubles, for these involve localized skin conditions and general constitutional conditions. It is not reasonable to expect a single brand of soap to be of universal service to disinfect the skin. Soaps highly advertised as having unusual properties usually cannot live up to their claims. In selecting a soap for regular use avoid the medicated and the cheap soaps—also those for which specific claims are made. Otherwise the choice may rest, with safety, on one or more of a large variety.

SPANK BATH, WET-TOWEL.—This bath is the "invention" of Dr. George Wharton James, who has used it for a good many years in a large variety of cases, and with good effect. It is a rather undignified procedure, but there are few appli-

cations that can equal it in immediate tonic effects. Hence it is good for use when a very vigorous and quick reaction is required. A rather sharp smarting results from the spanking with the cold wet towel, and because of this smarting and the generally rigorous nature of the bath, it should not be administered without the consent of the patient after being apprised of its character. The effect of the bath is somewhat similar to that of the switching administered to each other by some of the hardy natives of the far North of Europe and Asia after their sweat baths. The colder the temperature of the water used the greater the tonic reaction.

Procedure in Wet-towel Spank Bath

The patient may recline or may stand in a foot-bath with water at a temperature of 104 to 106 degrees or even higher, and his face, neck, and chest are thoroughly wet with cold water. Then, beginning with the buttocks, spanking is done quickly and vigorously with the cold wet towel, in the following order: up the spine, down and across the back, down both legs at the back, the feet, up the front of the legs, the chest, and then the abdomen, though the spanking here must be lighter than elsewhere. A light towel, either linen or Turkish, should be used and should be saturated with as cold water as can be secured. The spanking should be by quick,



The spank bath, in which a cold wet towel is used, may be administered with the patient reclining prone as illustrated, or it may be with the patient standing in a foot-bath with water at a temperature of 104 to 106 degrees or even higher. The spanking should be by quick, sharp taps with a light towel saturated with as cold water as can be secured. Reaction from this bath is prompt and permanent.

sharp taps rather than heavy, dull, thud-like blows. Reaction from this bath is immediate and permanent.

In cases of hysteria, great cerebral excitement, insomnia in those of vigorous body and sound mentality, alcoholic excess and numerous other conditions, this bath has surprisingly prompt and beneficial effects—so much so that there is no bath or other procedure equal to it for the purpose for which it is employed.

SPINAL DOUCHE.—See *Localized Douches,* under *Douches.*

The Splash Bath

SPLASH BATH.—See *Bedroom Bath,* the method of bathing described under that heading being the simplest form of a splash bath. This is a simple and convenient method of taking a bath when one is limited as to facilities. Because not even a sponge or cloth is required it is even more convenient than the sponge bath.

Another method of taking the splash bath requires one to squat or kneel in the bathtub. There need be only three or four inches of water in the tub, even less. In fact, there need be none at all, the water being caught in the hands as it comes from the faucet. From the hands it is quickly splashed over every part of the body, beginning with the face and proceeding down the body to the feet. The hands may friction each part somewhat immediately after carrying water to it, or the friction may be reserved for the towel (or the hands first and then the towel) after the water bath is completed.

The Hot Splash.—Although hot baths usually have a relaxing influence upon the body, a hot splash bath may be taken in such a manner as to stimulate and invigorate—with much the same general effects as result from a cold bath. There are some cases in which, perhaps, the hot splash is even preferable to a cold bath. But to be energizing such a bath must be of short duration.

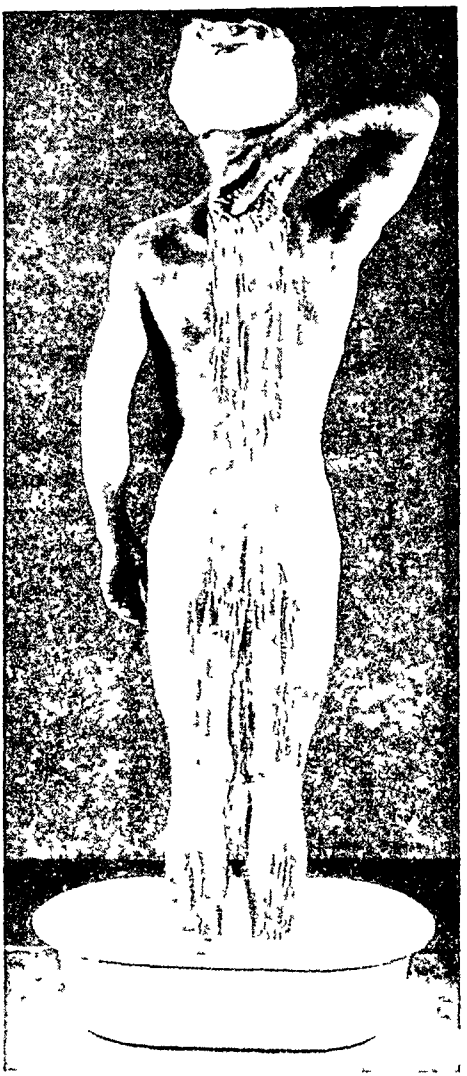
Hot Splash

The hot splash bath cannot be taken satisfactorily in a small basin. Three or four inches of hot water (not warm) should be allowed to run into the bathtub, in which the bather sits and rapidly splashes the hot water over the entire body for a few seconds. This will bring large quantities of blood into the skin, and there will be the general exhilaration that comes with the reaction from a cold bath, though perhaps in

less degree, or at least less permanent. Bear in mind that the bath must be *brief* to accomplish this result. If continued for more than a minute or so, there will probably occur the reaction of chilliness, which is depressing and entirely undesirable. After the splash the body should be rubbed vigorously, preferably with a coarse towel.

SPONGE BATH.—The sponge bath is sometimes called an *ablution;* also, it is usually taken not with a sponge but with a coarse towel, in which case it is called either the sponge bath or the *towel bath.* It differs, however, from the cold towel rub (See *Towel Rub, Cold*).

The Cold Sponge Bath.—The sponge bath proper is a tonic bath, hence water below the temperature of the body is employed. It is not necessarily a procedure for invalids, though perhaps it is more often used for such than for vigorous individuals. As a self-applied bath it is excellent for those beginning the daily tonic bath, regardless of the condition of general health and of vigor; but it is particularly to be recommended for those whose reactive powers are limited. The cold plunge and shower are more invigorating if one can react promptly and completely from them; but even the most delicate individual, whether ambulatory or bedfast,



The Sponge Bath

In the sponge bath, the best order of procedure is to start with the chest and abdomen, then the back, and then the arms and legs. A large sponge should be used, frequently filled with water.

Cold Sponge

can take a sponge bath and profit from it. This bath is a very satisfactory substitute for tub and shower baths when the facilities for the latter are lacking.

If a very large sponge is used, filled to capacity with water and then held above the head and chest, shoulders, and back, the effects are similar to those of a shower bath, though necessarily somewhat less pronounced. Many athletes have trained with just this kind of an improvised shower bath, or sponge shower. But as a general thing the term "sponge bath" is applied to the washing or rinsing of sections of the body by means of a sponge, coarse towel, or suitable cloth.

Manner of Taking a Sponge Bath



The sponge bath can be taken anywhere and with very little water. It is better, however, for the patient to stand in a tub and to use plenty of water in sponging his body.

The chief advantage of the sponge bath is that it can be taken anywhere and with very little water. However, for greatest pleasure and benefit, for those in normal health or even somewhat below normal, it is better to use water freely while standing in a bathtub or other fairly large tub. The temperature of the water used should be determined by the strength, vigor and reactive ability of the individual, remembering that the colder the water the more in-

vigorating the bath will be, provided it is not so low in temperature as to prevent perfect and prompt reaction. In case of a delicate person it would be advisable to start with tepid water, which is barely below body temperature (about 86 degrees), gradually reducing the temperature through temperate and cool until normally cold water may be used with perfect reaction.

The best order of procedure for those possessing good vigor is to start with the chest and abdomen, then the back, the arms, and the legs. In this order all parts may be bathed before drying any part. If a towel is used, the back may be given an excellent friction bath at the same time by sawing the towel lengthwise and crosswise of the entire back. The entire body may be given much better friction with the towel than with the sponge, an important consideration when the reactive powers are below normal, or when the bath is decidedly cold or the room temperature somewhat low. But even with the sponge fair pressure can be given except to the back.

Procedure for Sponge Bath

If the bath is given in the above manner to a patient, it is usually advisable that he stand in a basin of water at from 104 to 110 degrees. After the bath is completed, a sheet should be placed about him. Then the feet should be lifted one at a time and bathed by pouring cold water over them. The patient does as much of the drying as possible, the exercise encouraging reaction. After the drying is completed the patient should take moderate exercise if able to do so; if not, then his body should be dry-frictioned until reaction is completed. The patient whose vitality is low, or whose circulation or heart is defective, may stand in the basin of hot water a few moments before, as well as during, the bath.

The hot water in which the feet are placed will do much to keep up an active circulation and a satisfactory degree of bodily warmth, and thus enable one truly to enjoy the cold bath to the other parts of the body. This plan will make cold baths a possibility in practically every case, and no one who finds them unpleasant or detrimental should abandon them entirely without having tried it. Sometimes it is better for the patient (or normal individual administering the bath to himself) to kneel in the hot water while the upper body is

sponged, the water being deep enough to immerse the ankles when standing.

When the patient is unable to stand while taking this bath, it may be administered while he reclines on a bed or couch which is protected by a rubber blanket over which should be placed a Turkish towel. The rubber blanket should be so arranged that it will drain the water into a suitable vessel at the foot of the bed. The best order of procedure for the bath is first to bathe the face and neck, then the arms one at a time, then the chest and abdomen and the front of the legs; then, with the patient face down, the back, and the back of the legs. Each part should be dried immediately after bathing and then covered, all parts being covered except while being bathed. Only a very few seconds should be devoted to the bathing, the same time to hand rubbing, then perhaps slightly more time to drying. But the whole bath should require but a couple of minutes, unless it is to be repeated as an antipyretic. Even if the patient receives the bath standing the parts may be bathed and dried successively in the above manner, if the vitality is low or the reaction slow.

Sponge Bath Reclining

The temperature and duration of the bath vary according to the effects desired. If given to reduce fever, the temperature should be between 60 and 70 degrees and an abundance of water should be used. The bath may be repeated one or more times until the temperature is lowered, and rubbing should continue until reaction occurs. The body does not need to be covered in these cases, for the evaporation will aid in lowering the temperature. However, it is usually better to keep a part of it covered so as not to interfere with reaction. Feeble patients may be prepared for the bath by any procedure that increases skin circulation—by a hot bath, abdominal fomentations, hot-water drinking, or other means.

Temperature and Duration of Sponge Bath

When employed for tonic effects considerable cold water may be used, though, in many cases, it will be better to use a small amount of very cold water (even as low as 35 degrees), with vigorous friction, rubbing, or spatting. If the vigor is high, one may bathe the entire body with quite cold water before drying any part of it, then rub vigorously and exercise. This is a very tonic procedure.

Cold sponge baths are of service in all cases in which cold

friction, cold-towel rubbing, or brush scrubbing is beneficial. They are excellent in cases of general anemia or skin anemia, dropsy due to heart or kidney disease, and in low-grade fever conditions, such as typhoid fever. In the latter condition very cold water should be used on the lower extremities. Only a moderately dry sponge should be employed, the application to be of very short duration and followed by vigorous rubbing with warm hands. Such baths must not be used when the skin is cold or blue, or in the case of weak persons who perspire without special reason.

The Hot Sponge Bath

The hot sponge bath, with very hot water and very quickly given, is sometimes beneficial in cases of fever, as it reduces the production of heat. Local hot sponging is often very beneficial, perhaps especially to the spine for the relief of nervousness and irritation centering in or originating in this part; for certain types of headache, especially the nervous headache; for insomnia, and often for neuralgia of the intercostal nerves. The hot *alkaline sponge* is excellent for the relief of hives. For this application the water should be very hot (130 to 140 degrees), and a teaspoonful of baking-soda is added to each pint. Practically all itchings of the skin not due to eruptions are relieved by hot sponging. Friction is not applied after hot sponging, as after the cold, and towel drying is by patting instead of rubbing, or the patient is wrapped in a Turkish sheet.

The Alkaline Sponge

The Tepid Sponge Bath

The tepid sponge bath is an excellent substitute for perspiration when this function has been suspended by fever, serving to increase evaporation and bring about cooling of the body. It has not the undesirable effect of increasing temperature when reaction occurs, as often happens with cold sponging in these cases. However, it is applicable chiefly to those fevers that are not so high as to require the more vigorous application. For satisfactory results the skin should be sponged frequently in order that the evaporation may continue for a fair share of the time.

The Neutral Sponge Bath

Neutral sponge baths (90 to 98 degrees) are a calming, soothing procedure of much benefit in simple continued fevers, or mild fevers of uncertain origin, and in nervousness accompanied by a feeling of feverishness when the temperature remains normal.

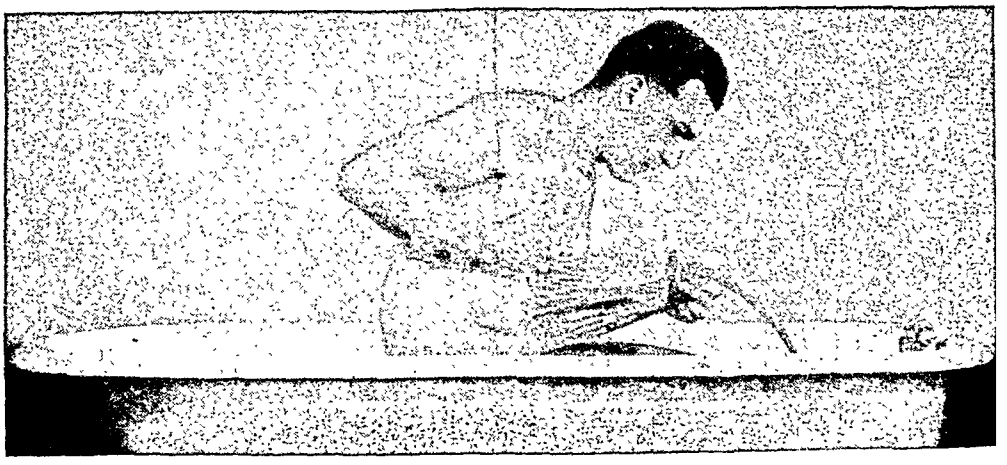
Alternate Sponging

Alternate sponging with hot and cold water is a powerful stimulant to the heart and lungs when applied to the spine and also an agreeable tonic to the entire nervous system. In many cases of neurasthenia it is particularly beneficial when applied either to the entire spine, or to the cervical region, or the cervical and dorsal regions. Alternate sponging is also very valuable in the treatment of sprains, strains, and bruises. Very hot applications, very cold applications, or alternate very hot and very cold sponging may be used in these cases. To secure the maximum effect and to save time when the two temperatures are alternated, two sponges should be used.

Spray Bath

SPRAY BATH.—Most homes cannot be provided with a horizontal jet, and many do not have the overhead shower apparatus. For these, if there is a bathtub, the spray appliance provides an excellent substitute, and it is even preferred to the overhead shower by many people. Most drug stores and hardware stores sell the portable hand-spray, which attaches to the faucet of the bathtub. It is provided with a perforated head that gives a number of fine streams, and a rubber hose about 5 feet in length that permits one to reach all parts of the body while seated or squatting in the bathtub, and some parts while standing.

Either hot or cold or alternate hot and cold sprays may be given by means of this appliance, and it is a most excellent means of rinsing from the body soap and dirty water after the tub bath, also for giving a shampoo. By no other means



The spray bath may be given in any home, whether there is an overhead shower apparatus or not. The portable hand spray, which attaches to the faucet of the bathtub, makes an excellent substitute for use when there is a bathroom.

in the average home can an ascending (perineal or anal) douche be given. Local regions can be sprayed by means of this simple apparatus better than by any other arrangement. A mild equivalent of a sitz-bath, or a finishing cold application after a hot sitz-bath where two tubs cannot be provided, can be secured by means of this spray. Feeble persons, or those who have poor circulation, often have quicker and more complete reaction after a cool or cold bath taken with the hand spray than after one from the overhead shower. One reason for this is that the water is confined to a smaller area during the application, the spray head being smaller than the shower head. No bathroom is complete without a hose spray.

A Spray Shower Bath

An excellent method of securing a general "shower bath" by means of this spray is to kneel or squat or sit in the bath-tub and pass the spray, held close to the body, up and down each arm, then over the chest and abdomen, and then the back, finishing with the lower extremities while standing. The bath may be completed by an ascending spray or by a spray to the lower abdomen while seated in the tub. The face may be bathed by the hands, which catch the spray while the spray head is hung over the faucet.

If the water force is considerable the spray head may be held some distance from the body and a bath similar to that of the horizontal jet, but less intense, may be given. The mechanical effect is less pronounced than that of the horizontal



The portable hand spray is provided with a perforated head creating a number of fine streams, and the rubber hose permits one to reach all parts of the body.



The spray bath. When surrounded by a suitable curtain, as much force may be allowed as the water pressure permits. The cold spray especially should have considerable force. This spray is the most convenient method of terminating a shampoo. It is also a highly invigorating way to end a bath.

Benefits of Spray Bath

jet, which makes this a more satisfactory bath in many cases where the effects of the horizontal jet are desirable yet in which such a bath is too severe. The spray provides a more equal general shower than would the shower bath itself, because it can be given with equal force to all parts of the body, while the shower concentrates particularly upon the chest and shoulders.

There are numerous abnormal conditions in which the spray may be used with great benefit, as a palliative, or to aid in correcting the pathology. For neuralgia, enlarged, painful rheumatic joints, or irritation of the spine, the hot spray is excellent. The cold spray or the alternate hot and cold spray is excellent for sprains or strains, in place of the sponge bath, though only moderate pressure should be used. See also *Anal Douche* for pelvic disorders, including hemorrhoids. The neutral spray applied with special attention to back and legs with only moderate pressure for about five minutes, is excellent for insomnia of any ordinary nature.

STANDING SHALLOW BATH.—See *Foot-bath.*

STEAM BATH.—See *Russian Bath.*

STEAM INHALATION.—The inhalation of warm moist air has been used for generations, perhaps for centuries, for the relief of inflammations of the mucous membranes of the nose

and throat. Steam inhalation is an improper term, for actual steam is not inhaled; one inhales merely air moistened and warmed by steam. Many homes have their croup-kettles (small appliances for burning alcohol, usually), giving forth a very small spray of steam. Better arrangements may be made, however, by means of which much more steam will be formed and made available.

Steam Inhalation

A teakettle or basin placed on some portable gas, oil, or electric heating appliance beside the patient's bed will provide an abundance of steam. A metal canopy, a curved sheet of asbestos, or a specially made "horn" or conductor, may be used for bringing the steamed air near the patient's face, but not directly to it, as it is best that the steamed air should be somewhat mixed with other air when it is inhaled. The patient should lie at one side of the bed, and the water should be boiled rather vigorously.

Equipment for Steam Inhalation

Steam inhalations (as we shall call them for simplicity) are excellent in numerous abnormal conditions of the nasal and pharyngeal mucous membranes—especially catarrhal conditions, either acute or chronic, and in bronchitis, especially when acute; also in adenoids and enlarged and chronically inflamed tonsils, ozena, diphtheria and laryngitis. Soothing applications are necessary in acute inflammations in which the membranes are sensitive; hence the temperature of the air inhaled should be moderate. But in the chronic inflammations the temperature should be as high as can be borne. Ten or fifteen minutes each hour is the proper dosage for acute conditions; less often for chronic ones.

The steam or hot water has the same effect upon the mucous membrane that local hot applications have upon the skin. It carries an increased circulation through the parts, which aids in the loosening and the elimination of exudates and in the process of repair. This usually reduces the liability to infection by raising the resistance of the tissues. When a considerable quantity of steam or hot vapor reaches the mucous membranes, adherent secretions are detached and expelled; the nostrils permit freer respiration; pain and the sensation of pressure are reduced or dispelled; hoarseness becomes less pronounced; in fact, the patient notices improvement in all his symptoms. Three treatments daily, each one of fifteen

Effects of Steam Inhalations

minutes duration, may be sufficient. Following each vapor treatment the face should be bathed with a very cold wet towel, preferably wet in ice-water, for half a minute, to restore tone to the tissues and (by reaction) continue the hyperemia produced by the vapor.

STOMACH WASHING.—See *Lavage*. While the stomach may be effectively washed by means of the special stomach tube, this is often not necessary. An effective though not absolutely complete cleansing of the stomach may be secured by what may be called the water emetic. Three or four glasses of water heated slightly under 100 degrees will usually be effective as an emetic, especially if, after drinking, the throat is tickled from inside with the finger tip. Sometimes this is even more effective if two teaspoonsful of mustard or one teaspoonful of common salt be added to one of the glasses of water. This method of cleansing the stomach, while not equal in effectiveness to the stomach pump, is of service when the tube is not available, or when fear on the part of the patient precludes the use of the stomach tube.

Washing the Stomach

Another very effective manner of washing the stomach consists merely of drinking three or four glasses of fairly hot water (cold water will have good effect but not so pronounced as hot water) at one time, followed by body-bending, rotation and leg-raising exercises for five minutes, repeating the drinking and exercise twice or even three times. This method does not cause emesis (vomiting), but it does wash the stomach contents into the intestines and carry them down this tube, perhaps to the beginning of the colon or even into it. Such large quantities of water are not likely to be entirely absorbed from the stomach and small intestines, though a fair amount will be, to be later discharged in the urine or increased perspiration. But some of it will remain in the digestive tube, to aid in washing it for its entire length. This method is not to be recommended in cases where the stomach is considerably dilated or markedly prolapsed, unless perhaps the exercises are taken in the lying-down position.

The Water Emetic

STOMACH-TUBE.—See *Lavage*.

SUSPENSORY.—The suspensory and the athletic jock strap are not hydriatric appliances; but either of them offers a help-

ful means of relieving a varicocele or swollen or painful testicle or scrotum. If the sac of the suspensory or jock strap is wrung from very cold water once or several times a day and applied snugly, the moist heat generated will have a soothing effect and will aid in reducing inflammation. As refrigeration is beneficial in some inflammations, especially in gonorrheal orchitis (inflammation of the testicle), the cold moist supporter applied immediately after a cold sitz-bath or cold shallow sitz-bath prolongs the influence of the cold. Or a gauze or cotton or linen pad may be made to fit about the scrotum within the sac of the supporter, and wrung from very cold or ice-cold water at intervals during the day. A properly fitted suspensory used in this way combines the good effects of giving needed support to the organs under treatment with the benefits of the cold application. The Suspensory

SWEAT-BATH.—The sweat-bath has been used by aboriginal peoples from time immemorial. Among certain tribes of North American Indians it is still regarded as a religious rite and is required weekly. During its progress the Indians chant songs dedicated to their good god whom they believe instituted it for their benefit. In northern Russia and especially in Finland almost every house has in connection with it a bath-house especially equipped to produce vigorous perspiration. It has been said that a young man of Finland preparing for marriage builds a sweat-house first of all in the foundation of his future home. This is a room in which the bathers assemble and in which an abundance of steam is produced by pouring water upon red-hot rocks. The heated rocks are brought in in several relays so that the heat not only remains high but increases as the bath continues, until the bathers are dripping with perspiration and their bodies thoroughly heated. They then rush out of doors and either jump into cold water or roll in the snow, thus producing a most vigorous and healthful reaction. Sweat-bath

Civilization has many health disadvantages, one of the most prominent being the loss of pride in and benefit from good, honest sweat. The health value of sweating and of the sweat-bath is not appreciated by the majority of people. Women particularly endeavor to prevent vigorous perspiration, which is considered plebeian or vulgar. We would all

do well to emulate the Finns and many tribes of American Indians in this matter. All people who for any reason lack opportunities for or fail to take sufficient exercise, for its own sake or in connection with their daily tasks, to produce regular and copious perspiration, should take a sweat-bath at least once a week.

Need for Sweat-baths

The effect of heat, especially moist heat, upon the sebaceous or oil glands of the skin is to soften any plugs of accumulated secretions and extraneous matter and aid in their expulsion, and at the same time to dilate the surface vessels to their utmost extent. This not only promotes the removal of waste, but relieves internal congestion—a condition present in every individual whose skin fails to function properly and to sweat at least occasionally. The skin is the most important gland of our body and sweating is its most important function.

As soon as the surface of the body is cleansed, which will be only after the sweating has continued for some minutes, a cold application should be made to the entire surface of the body. This immediately causes a vigorous rush of chemically

Sweat-bath Procedure

cleaned blood to the internal vessels and organs, thus cleansing and nourishing the tissues and stimulating all the internal functions. The blood then surges back into the skin, which glows with warmth. Soon a balance between the external and internal circulation is established but both are on a higher level of chemical efficiency and purity than before the bath. All functions are increased, and congestions are overcome or reduced. The cold application may follow a warm or hot rinsing bath given as the sweat-bath is terminated.

This combined procedure also stimulates the nutritive processes and energizes the nervous system, so that not only the appetite, assimilation, and elimination are improved; but alkalization is stimulated, metabolism is increased, and general internal elimination of accumulated wastes becomes more regular. Cell processes throughout the body become nearer to normal, and the powers of resistance are increased, thus putting the body in better condition to withstand the encroachments of disease and age.

The sweat-bath should never be taken within an hour before or after a meal, and an even longer interval is better. Complete drying should follow the bath, and as a rule, it

should terminate with perfect relaxation for from one-half to one hour. But if reaction has been as complete as it should be, if a decidedly cold bath has followed the sweating procedure, and if sweating (at least copious sweating) does not return after the cold application, it is often advisable to take a walk of fifteen or twenty minutes in the open air, or a little light exercise just after the bath, or in many instances, a brief rest, depending upon the individual. It is often preferable to take the bath just before retiring, but this is not necessary. The sweat-bath is often used to advantage in cases of catarrh, defective circulation, beginning fevers, hydrophobia, and migraine, and to reduce weight in robust people with no arterial or heart involvement.

Sweat-bath Precautions

As for the methods of securing a sweat-bath see *Hot-Air Cabinet Bath, Russian Bath, Sweating Pack, Turkish Bath* and *Vapor Bath,* also *Electric-Light Cabinet* in Section 5.

Sweating Pack

Sweating Pack.—The sweating pack is merely the wet-sheet pack continued to the fourth stage (the four stages being: first, cooling; second, neutral; third, superheating; fourth, sweating). See *Wet-Sheet Pack.* During the last stage the vital processes of the body are very greatly stimulated, so that not only the skin but the nerves and internal organs perform increased amounts of work in a more nearly normal manner, and every cell in the body is beneficially affected. Toxic elements are destroyed and eliminated with increased rapidity, the heart action is increased, circulation is heightened. The sweating stage may be prolonged considerably if the patient drinks a glassful of water every thirty minutes. The water may be hot or cold, and it may contain unsweetened fruit juice. A glassful of hot water taken just before the bath will also bring on the sweating stage more quickly.

If sweating does not occur easily, as is sometimes the case, the pack may be preceded by a hot bath of three or four minutes, or more coverings may be put on the pack, or hot-water bottles may be placed along the sides of the body and at the feet beneath the top coverings. Sometimes there is less weakening from the procedure if the patient is taken from the pack after sweating is well established and wrapped thoroughly in dry blankets, with several hot-water bottles at the

sides and feet. A glassful of hot water drunk every ten or fifteen minutes during this dry pack, especially when there is friction applied over the coverings, will stimulate sweating. Tensing of the muscles, alternating with complete relaxation, will also stimulate perspiration. This may be done while in the pack, without joint flexion. The change from the wet-sheet pack to the dry-blanket pack should be made as speedily as possible. This pack is terminated by the same procedures used for any other sweating measure, care being taken not to chill the patient, thus nullifying some of the good derived from the bath.

SWIMMING.—See *Open-Air Bathing.*

SWIMMING TANKS.—Swimming in a tank differs in no way from swimming in the open, or, if the tank is in the open, from swimming in river, lake, or sea, so far as the exercise is concerned; and if the water is cold enough, without being too cold, the tonic effect may be equal to that of open-air waters. Usually, however, tank water is at a higher temperature than natural open-air swimming waters. All bathing is increased in value when associated with the invigorating and healthful exercise of swimming. Care must be taken, however, in swimming either in a tank or in open waters, not to remain too long in the water, as the temperature of the water is usually such as to cause the heart to overact, in order to maintain skin warmth or surface circulation; and, while the latter condition is one of the desired effects of the cold bath, it produces weakness instead of renewing energy if unduly prolonged. See *Open-Air Bathing.*

Swimming Tank

"T" BANDAGE.—See under *Compresses.*

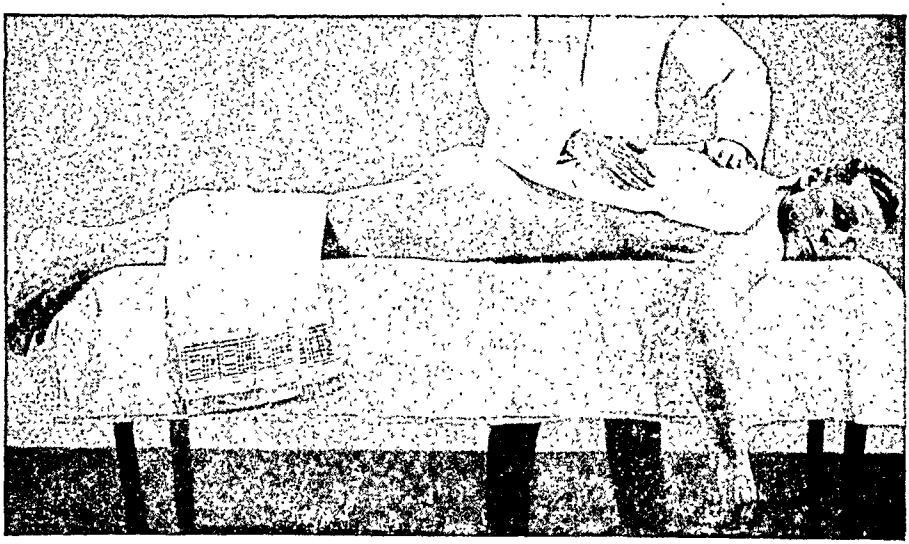
TEPID BATH.—Tepid baths (80 to 92 degrees, average about 86 degrees) are mildly refreshing and may be moderately cleansing. Any form of bath may be given at tepid temperature, though few are employed in this way. In some disorders tepid baths are to be preferred. Thus the tepid douche is excellent to quiet nervousness or excitability, as in hysteria, also for irritability of the spinal center governing the genito-urinary system. A tepid douche or pour to the head allays cerebral excitation and irritation, thus serving to bring sufficient calm to permit sleep in insomnia due to this cause, and to reduce maniacal excitement. The pour,

Uses of Tepid Bath

or affusion, is preferable to the douche, and should continue for from three to five minutes. The continuous tepid immersion is excellent in hysteria. But aside from its use as a curative or palliative measure, the tepid bath is to be recommended for those individuals who are too delicate to take cold or cool baths, or who have a genuine aversion to the lower temperatures, in which cases the best form is the sponge bath. As a mode of treatment this bath is further considered under *Full Baths or Immersion Baths* and *Sponge Bath.*

TOWEL RUB, COLD.—This is sometimes called the cold-towel bath. The distinction may be made that this is distinctly a rubbing bath, whereas the cold-towel bath may be more like the sponge bath, with more water used. In the cold-towel rub all splashing is avoided. There is an advantage in this bath over the bedroom splash bath in that a very excellent tonic application may be made to the spinal region and entire back, both by the cold application and by the friction of the sawing up and down and across the back with the towel. In fact this application is to be recommended for the back even when the splash bath is used for the remainder of the body, unless a bath brush fitted with a handle is used. If one stands on a large rubber sheet or sheet of oilcloth, considerable

Cold-towel Rub

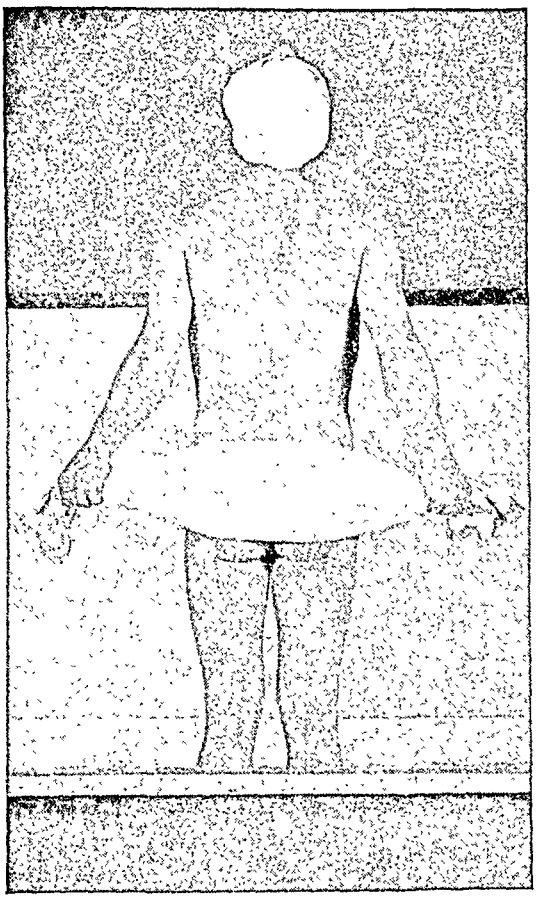


In giving the cold-towel rub, the body should be covered warmly, except the part under treatment. After the towel is in place, the attendant rubs it vigorously, keeping it pressed down firmly.

water may be left in the towel and the same frictioning secured while there will be somewhat more of a tonic effect.

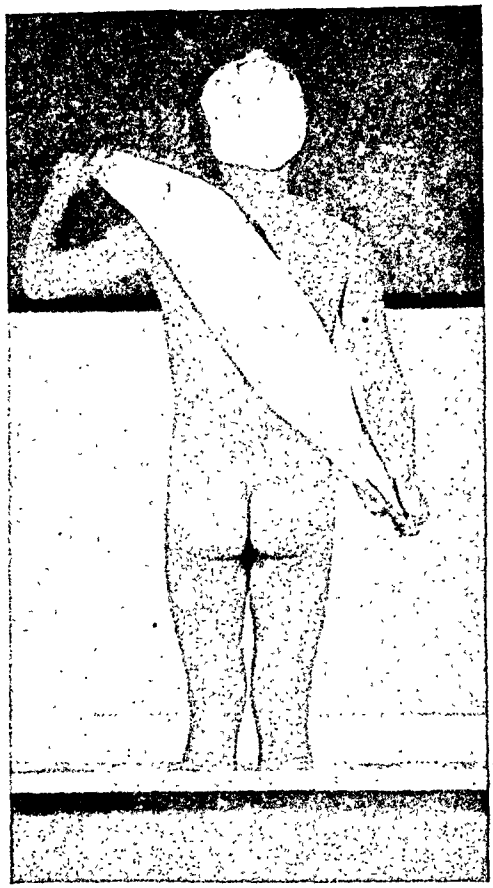
The Cold-Towel Rub for Patients has an effect similar to that of the cold-mitten friction bath but slighter in degree. It is also somewhat similar in effect to the sponge bath, but less vigorous. It is of special service for those patients who are feeble and cannot endure vigorous procedures and for those having only a slight elevation of temperature. In this procedure the body is not rubbed with the cold wet towel. Instead, the towel, after being wrung moderately dry from cool or cold water, is spread over as large a surface of the body as possible, being in direct contact with the unclothed body. An ordinary hand towel or Turkish towel may be used, the former being better. The body should be covered warmly except for the part under treatment. After the towel is in place the attendant rubs the towel vigorously, keeping it firmly pressed down upon the surface of the body and covering as much of the towel as possible with his hands, which move from part to part until the entire towel becomes warm. A dry towel then replaces the wet towel and this is rubbed until complete reaction is established. This part then is covered and another part bathed in the same manner, this continuing until the entire body has been treated, when the procedure may be repeated, according to need or the effect desired. The body is not rubbed *with* the towel, but through it, the hands sliding over the towel and the patient holding it.

Cold-towel Rub for Invalids



Various movements may be employed in giving the towel-rub. A good-sized coarse towel may be used.

This is a very excellent procedure in case of pronounced depression in which the extremities are cold. The towel should be wrung as dry as possible and the application should be short and followed by vigorous rubbing, with particular attention to the extremities. Other conditions in which the application is of value are anemia, "bleeder's disease" (hemophilia), chronic indigestion and rheumatism, diabetes, emaciation, heart weakness, neurasthenia, obesity, tuberculosis of any part of stomach, and acidosis. In these cases the towel should at first be wrung quite dry from water at from 60 to 70 degrees, and, as vitality and reaction increase the temperature of the water may be progressively lowered and somewhat more of it left in the towel. There are few conditions in which this application cannot be made, but in serious heart weakness or in asthma it should not be made to the chest until reaction is first established by dry friction. As strength and vigor improve, the beneficial friction effects can be further enhanced by the use of a stiff *bristled scrub-brush*.



Application of Cold-towel Bath

The dry towel rub is an excellent friction bath. It may be self-applied, or be given by an attendant.

Cold-towel Bath, Various Uses of

TUB BATH.—See *Full Baths or Immersion Baths.*

TURBAN, COLD.—The turban is merely a towel applied in such a manner as to form a covering for the head, to be used during numerous body applications, both hot and cold. It is always applied cold. The manner of application is as follows: Take a Turkish towel of ordinary size and fold it twice

The Cold Turban

lengthwise so that it is from four to six inches in width. After having been wrung from cold water only enough to remove the excess water, apply one end to the side of the head toward the rear, bring it forward on that side and on around to the front again, securely holding the starting end where it overlaps. When the front of the forehead again is reached the remaining or free end of the towel is opened one half and thrown back over the top of the head to meet the encircling portion at all points. The hair may or may not be wet with cold water before this application, but usually this is not necessary. In fact, the wet hair itself answers the purpose of a turban, though there are many patients who would chill and fail to secure good reaction from cold applications if their hair were thoroughly wet. The turban tends to contract the cerebral vessels sufficiently to prevent too pronounced dilation or contraction from the general body baths or applications. It is usually used in connection with other hydrotherapeutic measures. Its use is especially important in taking sitz-baths and blanket packs, cabinet baths, and other applications which greatly quicken the general circulation, or tend to increase cerebral circulation to an appreciable extent.

The Cold Collar is often used in place of the turban. It is merely a cold wet towel placed about the neck instead of about the head. It answers the same purpose as the turban, but is often still more effective, since, by contraction of the vessels in the neck, it more directly prevents increase in cerebral circulation. It should not be used when the brain is already congested, the turban then being better. In some instances both the turban and the cold collar are employed.

The Cold Collar

TURKISH BATH.—While the Turkish bath is familiar to a good many people in cities, the majority of people know little or nothing about it. It is similar to the hot-air cabinet bath, but differs from it in that the head is included—since it is taken in rooms of fair size in which one or several people may remain at the same time. As administered by the Constantinople Turks and the Cairo Arabs, as well as in modern Turkish bath establishments in practically all the large cities of the world, it is accompanied by friction, massage, shampooing, and often by various joint movements. Special facilities must be provided for the proper administration of this bath, the divi-

Turkish Bath

sions of which include dressing rooms, a tepidarium or warm room (with a temperature of from 110 to 130 degrees), a calidarium or hot room (temperature from 150 to 180 degrees), a shampoo room, a douche appliance, and a cooling room, with or without a plunge. In a great number of establishments the rooms are heated by means of steam pipes or coils, there being no facilities for changing the air. In some the heating is done by indirect radiation, which insures or makes possible thorough ventilation. Good ventilation is necessary if the atmosphere is to be kept free from poisonous emanations from the bodies of the bathers, which soon so pollute the air as to overbalance any good secured from the treatment.

After discarding all clothing in the dressing room the patient enters the tepidarium, having first drunk freely of either hot or cold water, according to desire. Three or four more glasses of water are drunk while in the bath. The bather remains in the tepidarium until perspiration begins, the attendant rubbing his body every minute or two during the first ten or fifteen minutes to encourage perspiration. He then enters the calidarium, where he remains for several minutes, usually about ten, but often twice this length of time, during which time perspiration is copious. From this room he goes to the shampoo room, lies upon a slab, and receives a rub-down with pressure, short rapid and slower long strokes with the wet hand of the attendant. These movements loosen and remove the dead cuticle and accumulated eliminative matter from the pores and subcutaneous tissues. A scrubbing with soap and water and a shampoo brush, or special mitt or cloth (which should be quite coarse), follows, after which a shower is administered. This starts with hot water (104 to 105 degrees) which continues until the skin is thoroughly reheated, then, the hot water being turned off suddenly, a cold douche or spray is immediately given. If a plunge is provided the bather may then enter it (temperature from 60 to 70 degrees) for a few seconds if he desires. The body is now quickly dried and vigorously rubbed, after which the bather reclines in the cooling room for fifteen or twenty minutes with very light covering. The bather should not leave the cooling room until the pulse-rate has become normal and the skin thoroughly dry and cool.

Method of Taking Turkish Bath.

The general systemic effects of this bath are somewhat

greater than those of the hot-air cabinet bath, owing to the fact that the mucous membrane of the bronchial tubes and lungs, as well as the cutaneous surface, is exposed to the superheated air. During the preliminary warming in the tepidarium the heart action usually is greatly increased. During the time in the calidarium the breathing becomes quite rapid and is of the thoracic type. Sweating is very greatly increased by this bath, from two to four pounds in weight being sometimes lost in a bath of an hour's duration. This indicates that there is a rapid increase in the flow of body fluids toward the surface—which is further indicated by the reduction of urine for the time being and occasionally by constipation. The rapid loss of body fluids makes copious drinking of water during and after the bath very necessary. Because there is such loss of body fluids, part of which, of course, must come from the blood and the blood serum in the tissue cells, there is a reduction of blood pressure.

Effects of Turkish Baths

But it should be borne in mind that the Turkish bath can easily be abused. Some people rely upon these baths almost entirely for their extra elimination, instead of securing perspiration by exercise. Turkish bath establishments became somewhat "notorious" as the rendezvous of alcoholic inebriates and those who dissipated otherwise, especially by dining heavily, by sexual orgies and very late hours, the baths removing some of the causes of lowered vitality that followed and bringing, temporarily, a feeling of well-being. When one is clogged up with wastes through negligent and harmful habits, a Turkish bath will doubtless be of some value and permit one to continue for a time longer with little immediate danger. But these baths cannot be taken as a substitute for healthful exercise and out-door living. As a means of elimination when nothing better is available they may be recommended.

Abuse of Turkish Baths

When the ventilation of the bathing apartments is properly attended to both the Turkish and the Russian bath may be highly recommended in numerous abnormal conditions. The bather should always insist upon a thoroughly clean individual brush, mitt, or cloth for the scrubbing, to avoid the possibility of infection from some previous bather. When not overdone, these baths are of value in many chronic mala-

dies, but their frequency and the degree of sweating must be governed by the individual case. See *Hot-Air Cabinet Bath* for indications for their use. No one, however, should use these baths without first having had a thorough physical examination to determine the condition of all vital organs.

When Not to Use Turkish Baths

The Turkish bath should not be employed in heart disease, Bright's disease, lung disease, arteriosclerosis, except in its early stages, diabetes when the patient is thin, after recent apoplexy, or in fever conditions. Occasionally it may be used briefly merely as a means of warming the body preparatory to some cold application.

VAGINAL IRRIGATION.—As early as the fifteenth century the vaginal "douche" was used for uterine affections. This irrigation is employed by means of a fountain syringe having a rubber tube somewhat larger than the one usually employed, to which is attached the vaginal tip or nozzle of hard rubber or glass. By means of this appliance water at any desired temperature may be injected into the vagina—which should always be done with little or no pressure. The vaginal tip or nozzle may be straight or somewhat curved for easier entrance. It has no opening at the end but has several small openings around the sides near the end. This arrangement prevents the entrance of any of the solution into the uterus with possible serious results, for the stream is sprayed upon the walls of the vagina thoroughly flushing and cleaning them. The application is of great service in numerous disorders of the vagina, uterus, ovaries, and other female structures, when a proper temperature is used. Usually it is best for the treatment to be taken with the patient reclining on the back, hips elevated, the fountain reservoir two or three feet above the hips, and with suitable arrangements for carrying off the water as it comes from the vagina. The tube should be inserted along the rear wall of the vaginal canal until it reaches the farthest point, which will be behind and somewhat above the cervix. When in this position there is no danger of the water entering the uterine cavity, and, besides, as the water escapes from the tube into the vagina, it flows over the cervix and downward in contact with the walls of the vagina, which it directly affects and through which it reflexly affects the circulation throughout the pelvis.

Vaginal Irrigation

Effects of Vaginal Irrigation

Effects of vaginal irrigation.—From experiments it has been definitely established that applications of both heat and cold will relieve the hemorrhage of uterine congestion, the cold having a more pronounced effect than heat. Heat relieves partly or completely excitability and contractions of the uterus, which are increased by cold applications. Cold is much more likely to cause painful contractions of the uterus, and to increase or bring on various pains in the pelvis, for which reason heat usually is employed.

Hot Vaginal Irrigation

Hot vaginal irrigation (102 to 105 degrees) is excellent in cases of pelvic pain, and in inflammation of the uterus, ovary, or tubes. Very hot irrigation (temperature as high as can be borne, even up to 130 degrees) is an excellent hemostatic (hemorrhage arrestor). Sometimes this will fail to check the flow of blood, in which case cold water (60 degrees or thereabouts) will usually be effective. It should first be boiled, then cooled. If the cold irrigation produces pain, an excellent treatment is the combination of the cold irrigation with the hot sitz-bath. In some instances the opposite combination is better—the hot irrigation given simultaneously with the cool sitz-bath.

The effects of vaginal irrigation may be enhanced by having a bulb syringe attached to the tube of the fountain apparatus, by means of which intermittent jets may be made. In some instances it is better to employ alternate hot and cold irrigation, which may be given by using two fountain bags attached to the one tube, or by two bags with separate tubes. The hot irrigation may be with water at temperatures from 102 to 120 degrees, the cold at temperatures from 60 to 80 degrees.

Vapor Bath Appliances

VAPOR BATH.—The vapor bath is very similar to the Russian bath in effects, but these effects are not so pronounced; and in mode of application it is very similar to the hot-air cabinet bath, the same kind of cabinet being used. Numerous home appliances have been devised for this bath. They consist merely of a portable cabinet in which the patient sits, with a basin containing water on a small gas, oil or electric stove beneath the seat, or with a pipe leading into the cabinet which conveys steam or hot vapor from a suitable arrangement outside. It is better to have a fairly large basin and a heating

unit that will boil a considerable quantity of water within a short time, so that much steam is produced quickly. However, it may not be possible to arrange this, in which case a slower heating appliance and a smaller basin with less water may be used, the same effects being produced less rapidly.

It is often necessary to give this bath while the patient lies in bed. In this case the vapor may be directed beneath the coverings by means of a pipe leading from a teakettle spout or one specially attached by a tinsmith to the center of the lid of a fairly large cooking vessel. The bed-covering should be elevated above the patient to make a chamber of fair size, which may be done with sections of barrel hoops, an inverted chair, a box or similar devices. See also *Hot-Air Cabinet Bath* for a simple portable cabinet.

The vapor bath is valuable in all cases in which the sweating process is desired, that is, in which the hot-air, Russian, or Turkish bath is of value. One of the most valuable uses, also, is for heating the skin preparatory to some cold application, in which case the bath should not continue longer than five minutes. It is particularly beneficial in those cases in which the skin is too sensitive or irritable for the dry hot-air bath or other dry heating procedure, the moderately hot moist atmosphere being much better endured in many such cases. Dry and "lifeless" skin is benefited more by the vapor bath than by the electric-light or hot-air cabinet bath, the glands of the skin being rendered much more active by the former than by either of the latter. The indications and contraindications for its use are much the same as for the hot-air bath. Conditions in which it is particularly serviceable are chronic rheumatism and gout, chronic toxemia, obesity, the third stage of syphilis, neuralgia, sciatica, neurasthenia, hysteria, sick headache, hypochondria, bronchitis, carbuncle, general colds, dropsy of pregnancy, beginning fevers, ozena, scleroderma, skin affections, barber's itch, boils, and asthma.

Value of Vapor Bath

WARM BATH.—The warm bath has little value as a therapeutic measure, except that it is more satisfactory than other measures for the production of calming effects, in other words, for sedative purposes. When employed for such purpose it should be taken immediately before retiring, or, in case the patient is bedfast, just before being made ready for the night.

The water temperature should be near 95 degrees, and the duration should usually be not less than thirty minutes and may be as much as two hours. Otherwise the warm bath is of value practically only for its cleansing effects.

Warm Bath, Uses of

The warm bath with soap—the old-fashioned "wash"—while not a definite hydriatric procedure, since it has little or no constitutional or tonic effect, is a very valuable hygienic measure. It is, primarily and almost solely, a cleansing procedure, and as such is important in preserving normal activity of the skin. This has been referred to in *Health and Bathing* in this section.

Perfect cleanliness cannot be maintained with cold water. Cold baths are needed as tonic applications, but while they will remove some of the outer layers of dirt, they will not dissolve and remove grease and grime and the fine dirt that adheres closely to the skin and fills the pores. For removing these nothing can take the place of warm water and soap plus scrubbing. See *Soap and Its Uses.* Hot baths, employed by most people for this cleansing purpose, are not necessary, since it is the soap, particularly, that dissolves the grease and dirt and prepares it for removal from the body. All that is necessary in addition to the soap is water at a temperature approximately that of the body, either slightly above or slightly below and some measure of scrubbing. Prolonged general baths are not necessary nor desirable for cleansing purposes. Three minutes usually is sufficient, ten minutes being long enough in any case. The surface should then be rinsed with clean warm water, to remove the soap, the loosened dirt, and the dirty water. After the rinse with warm water, preferably with a spray or sponge with freshly running water, there should be a quick cool or cold spray, sponge, or a clear-water scrub with a brush for at least a few seconds, as a tonic procedure to overcome the relaxing effect of the warm water. The only exceptions to the use of the cool or cold application are: when one is retiring immediately and the tonic bath will disturb sleep, and when there is already an irritability or excitability of the nerves or brain. In these cases a cool or cold bath should usually be taken upon arising.

Warm Bath for Cleanliness

In the many homes in which there is no bathtub there is usually at least a weekly cleansing bath, the laundry tub or

the circular wash-tub being used, the water heated being on the kitchen stove if necessary. This is a thoroughly satisfactory method of taking the cleansing bath, provided an additional tub or pail of warm water is conveniently at hand for rinsing the body, and another containing cool or cold water for the final tonic application. But even this convenience may not be at hand, in which case a cleansing bath may be taken with a sponge, rubber sponge, or large Turkish cloth, and a small basin of warm water, the body being bathed in sections and finally rinsed thoroughly with clean water, with a final cold or cool "sponge shower." When a shower arrangement is at hand, many people prefer to take their cleansing bath as a shower—one of the most satisfactory of all cleansing baths, since there is no possible chance of using dirty water over and over again, and also since the change from warm to cold water may be made quickly and with convenience.

Warm Bath Without Bathtub

The frequency with which the warm cleansing bath should be taken will depend somewhat upon the individual and his physical condition, but especially upon one's occupation. When the daily tonic bath (cool or cold) is taken, when the occupation is such that one is not exposed to dust and dirt, and when one perspires little because of cool weather or comparative inactivity, the cleansing bath should not be necessary more often than once a week, or perhaps even less. The amount of body odor also must be taken into consideration, for the more pronounced the odor, the more frequent should the thoroughly cleansing bath be taken. Proper dietetic and other treatment, however, will bring freedom from this unpleasant condition. If the skin is very sensitive, or dry and easily irritated by soap, once a week should be often enough for the warm soap bath, perhaps once in ten days if other conditions are suited to such long intervals. Ordinarily, this bath should be taken twice a week. This is often enough for most people, and yet it is not so often as to involve an excessive use of soap. Farmers, day laborers, machinists, those working in coal and cement, flour, and other "flying" fine elements that penetrate the clothing to the skin and there adhere, require the warm cleansing bath more often—perhaps, every day. Those who perspire freely also should have frequent cleansing baths, every day not being too often. While the perspiration carries

Frequency of Warm Bathing

with it some of the elements that tend to clog the pores, it leaves a residue upon evaporating or is absorbed by the clothing which becomes rancid under the influence of the moist warmth beneath the clothing. Of course, if very porous clothing is worn and not too much of it, there will be less need of frequent soap baths. But the parts which perspire most freely and which are least exposed to the air, such as the armpits, the perineal region and the feet, should be cleansed daily, whether or not the entire surface of the body is bathed so frequently.

There are some people who are opposed to bathing at all, on the presumption that the skin will cleanse itself and that the bath interferes with this natural action of the skin. It is true that some dirt will be carried from the body surface with the scale-like cells of the scarf-skin which gradually rub off. But this process is interfered with by clothing, while, on the other hand, proper bathing facilitates it. The esthetic sense of most people makes them unwilling to carry around with them accumulated layers of stale, musty, rancid perspiration and thus become offensive to the senses of others.

While these writings are largely for the purpose of teaching, through hydrotherapeutic measures, how to acquire, maintain, and increase the vital resistance of the body in order that it may become immune to germ infection, there is, nevertheless, no need of "tempting Fate" by making ourselves attractive to the germs through external uncleanliness. Also, there is no need of having the surface of the body in such condition as unduly to attract flies, mosquitoes, and other insects and vermin. To avoid these conditions those who have been introduced to the bath as a hygienic measure will continue to bathe, using the various cleansing processes to aid in the natural, self-cleansing action of the skin, not to interfere with this action.

The Bath as a Hygienic Measure

WARM COMPRESS.—See under *Compresses.*

WARM ENEMA.—See under *Enema.*

WATER-DRINKING.—See *Drinking Water.*

WATER EMETIC.—See *Stomach Washing,* also *Lavage.*

WET FRICTION, COLD.—See *Mitten Friction Bath, Cold.*

WET GIRDLE.—See *Girdle or Abdominal Pack.*

WET-HAND RUB.—This is the simple procedure of rubbing the body with the wet hand, but as a definite hydri-

atric measure there is a method of doing it that is best. For this bath the patient reclines on his back on a couch preferably high enough so that the attendant need not stoop much. Women, especially nervous women, prefer to have the hair kept dry, which should be done by means of a dry Turkish towel wrapped about the head. With men it is well, but not necessary, to wet the hair by running the wet fingers through it or a saturated towel over it. In any case a dry towel should be so wrapped as to protect the ears, as the water will run downward from the hands. It is necessary, also, that if a bed or rest couch be used, a rubber sheet be placed beneath the patient, with a sheet over it.

The Wet-hand Rub

The attendant or nurse dips the hands in water placed at the side, at a temperature of from 45 to 75 degrees, applying them to the forehead and to as much of the face as possible, one to each side. The wet hands are then carried from the center of the forehead outward over the temples and downward over the cheeks in a half-circle movement to underneath the jaw. This movement is repeated several times. The face (and head if wet) should not be dried until the bath is completed. Now the chest is rubbed, beginning with the upper rib section, then



In giving the wet-hand friction bath, one may use the bare hands, brushes of various descriptions or a towel sufficiently coarse or heavy.

the sides, then the "pit of the stomach," but not the abdomen proper. The chest is gone over three or four times with considerable pressure but with short strokes made rapidly, then quickly dried with a towel and rubbed briskly until the skin is red.

The arms are then bathed one at a time, each arm being rubbed vigorously with one hand with strokes going its full length while the other hand holds it steady. If the patient is strong enough he may hold up his own arm, thus permitting the attendant to rub with both hands. Several strokes are made between fresh dippings in the water, the entire arm being frictioned. The hand is then rubbed between the attendant's thoroughly wet two hands, this to be terminated by a few smart slaps to the palm with the attendant's palm. The arm is then quickly and completely wrapped in a Turkish towel and rubbed until reddened, the patient holding one end of the towel to prevent its rolling up.

Manner of Giving Wet-hand Rub

The abdomen is now frictioned, one hand following the other in several transverse strokes over the entire part, then making a circular motion following the course of the colon. The part is dried and covered. Next, one lower extremity is uncovered and the thigh rubbed downward, then the other; then the legs, one at a time are stroked several times, and this is followed by sufficient dry rubbing to reestablish circulation. The patient now turns face downward, resting the forehead upon the folded arms. The neck first is wet-frictioned, the hands passing around to the front as far as possible, as well as over the back and sides of the neck. The back surface now is frictioned in the following order: the upper back, the shoulders, the upper arms, the middle of the back, the lower back, the sides, concluding with several vigorous strokes with the freshly-wet hands from the neck to the coccyx. Each part is dried upon completion of the frictioning and covered as soon as reaction is complete. The treatment terminates with similar rubbing to the thighs, legs, and feet. The feet should not be rubbed, but percussed or spatted.

Duration of Wet-hand Rub

Five or ten seconds will usually be all the time that should be devoted to the wet-hand frictioning of any part before the dry towel is applied. If reaction is delayed or imperfect, light percussion or spatting should be applied after drying.

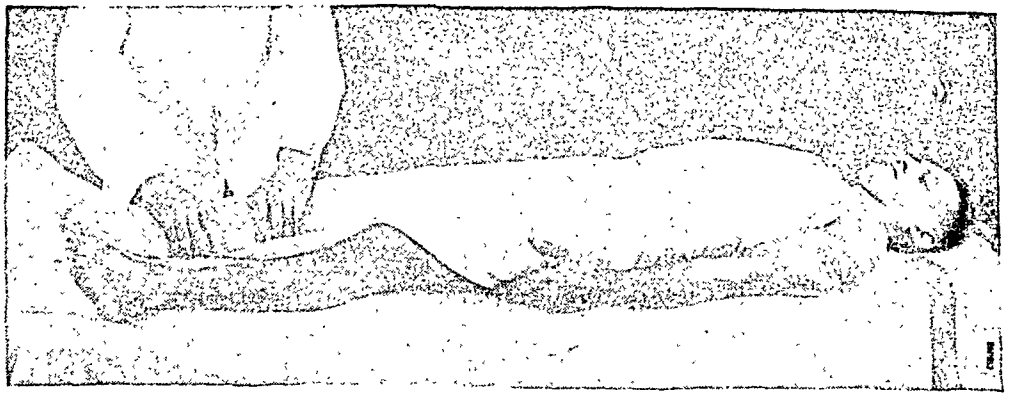
Each and every phase of this treatment is done quickly, and a good reaction must be secured in one part before proceeding to another. It is important that the skin circulation be good, with the skin warm, before the bath begins, an excellent time of day for it being in the morning before arising.

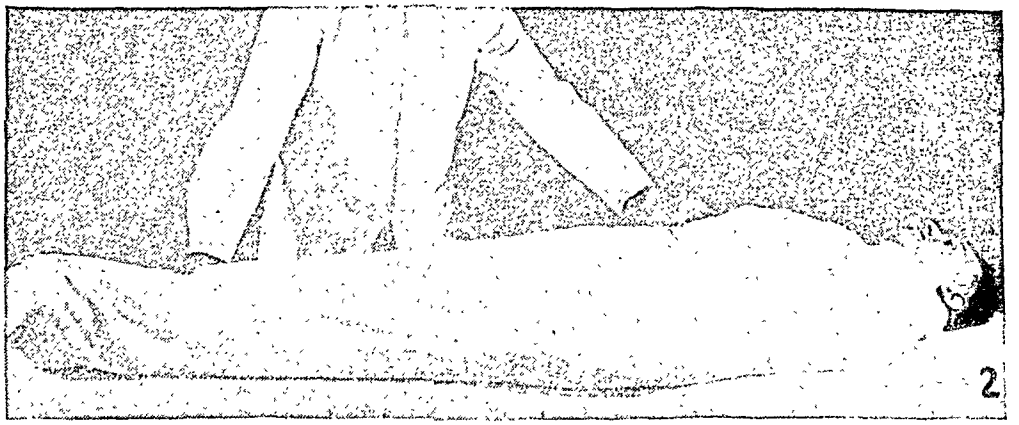
Uses of Wet-hand Rub

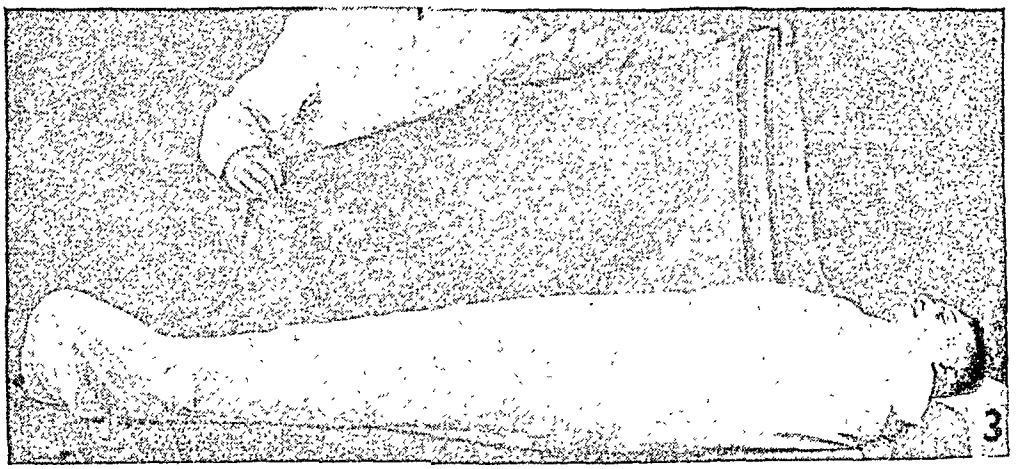
If this bath is used as a means of controlling fever (for which purpose it is excellent) it is often better to cup the hands and carry as much water to each part under treatment as possible, then friction vigorously with the wet hand as described above. The water temperature varies with the individual requirements, but the usual temperature is from 65 to 75 degrees. The face and neck are bathed with water colder than is used for the rest of the body. Reaction may be heightened and hastened by dry-towel rubbing followed by dry friction and hand percussion. The combination of the cold water and the friction acts as a mild general tonic as well as a beneficial stimulant to heart and lungs. If hot water is used instead of cold water, the bath has a soothing and pain-reducing effect; while if ice-water is employed the tonic and energizing effects are intensified appreciably. Both applications, with friction, produce a slight temporary rise in blood pressure.

Wet-hand Rubs for Children and Invalids

This is an excellent application for children of practically all ages, and for aged persons, as well as for hardier individuals between these ages who have fever conditions, or temporarily reduced vitality or nerve tone. In the case of children it is an excellent daily bath, but need not be administered in the reclining position. It is a favorable means of "training" the body to endure cold baths, since the small amount of water used, and the friction of the hand, which rapidly grows warmer as the treatment proceeds, greatly reduce the shock of the cold application. For this reason it is adapted to feeble individuals who have a poor reaction to cool applications, or an aversion to them. There is practically no degree of weakness or feebleness sufficient to contraindicate this application, which may be made even with ice-water with benefit when larger quantities of water at much more moderate temperatures could not be endured. Very low temperatures should not be employed with feeble, aged or very young individuals at first, but there should be progressive lowering of temperature (a







WET-SHEET PACK

1. In making the wet-sheet pack, note that, with the legs somewhat separated, one leg is wrapped snugly from the hip down. The patient then places his arms close to the sides of his body and the open side of the sheet is also tucked closely about the patient.
2. The open side of the sheet is pulled up and drawn tightly and snugly about the body, while the end of the sheet extending below is doubled backward beneath the feet.
3. A lengthwise-folded blanket must be laid over all for warmth, being tucked in carefully all along the body on both sides, and at the feet and shoulders and neck.

degree or two a day) as reaction and general condition improve. Often satisfactory results will be secured with feeble patients by giving this application only to the back. When the extremities are inclined to be cold through defective local circulation, the condition can be greatly benefited by very cold wet-hand friction, especially when warm flannels are used to rub the parts after the water application.

This is an excellent bath to use in practically all forms of acute and chronic disease, especially chronic conditions associated with low vitality or anemia. One great advantage of the bath is that it is capable of variation in degree, hence in tonic and circulatory effects. In some of the baths described in the preceding pages more or less general rubbing during the baths was mentioned. Local cold wet hand, mitten, or scrubbing brush rubbing is excellent in a great variety of abnormal conditions. The reaction from the heating compress will be augmented if the part is first frictioned with the cold wet hand. About the only conditions in which the bath should not be used are various skin eruptions, whether acute or chronic.

WET-SHEET PACK.—This application consists of a wet sheet wrapped immediately about the body, with dry outside wrappings to prevent evaporation. The necessities are: a double blanket of large size, a single blanket (all woolen), one large cotton sheet, one large linen sheet, one linen towel of large size, and two or three gallons of water at 60 to 70 degrees temperature. Sometimes, but rarely, higher or lower temperatures are used. While one may devise a method of application that suits individual cases better, the following method is usually satisfactory:

Description of Wet-sheet Pack

1. The cotton sheet is folded lengthwise once and laid crosswise at the head of the couch, its upper edge covering the lower one-third of the pillow.

2. The double blanket is spread over the couch so that the upper edge is about two inches below the upper edge of the sheet and the side nearest the attendant hangs over two feet.

3. The linen sheet is then wrung out of the water at hand and spread out upon the blanket so that its upper edge is between one and two inches from the upper edge of the blanket. Two attendants may grasp the ends and twist in opposite directions until it is as dry as possible.

4. The nude patient lies upon the wet sheet so that his shoulders come about three inches below its upper edge.

5. With the patient's arms raised overhead, the attendant draws the farther side of the sheet over him, fitting it well under the shoulders and closely along the entire body. With the legs somewhat separated, the farther leg is wrapped snugly from the hip down. The patient now places his arms close to the sides of his body and the near side of the sheet is then tucked closely about the near side and then about the rest of the body. The sheet is folded carefully, snugly, but not tightly, about the shoulders, closely fitting the neck. The body is now entirely wrapped in the sheet except for the head and upper neck.

Method of Using Wet-sheet Pack

6. The farther side of the blanket is now brought up, drawn snugly across the body and tucked in carefully about the farther shoulder, side, and leg, the side of the neck being also fitted closely. The long side of the blanket is now pulled up and drawn tightly about the body so that it fits every part snugly, the patient being turned sufficiently to pass the end beneath him. The end of the blanket extending below the feet is then doubled backward beneath them.

7. The dry folded sheet beneath the shoulders is then folded snugly over and about them to exclude the air and protect the neck and chin from irritation by the blanket.

8. A lengthwise-folded blanket may be laid over all for additional warmth, being tucked in carefully all along the body, including the shoulders. If necessary, still more blankets may be used in this manner, but their number should be reduced as the patient warms up in the pack, which will usually take place within a short time if the application is properly made.

If the pack is applied loosely so that some parts of the body are in very light contact with the sheet, there will be evaporation, with resulting cooling, instead of the steady accumulation of heat and the strong reaction that should take place. Only when the pack is applied closely, both as to the wet sheet and the blankets, will disagreeable effects of chilling be avoided by the occurrence of prompt and vigorous reaction. In case the patient complains of local chilling at any spot the pack must be carefully adjusted or, if this fails, discontinued

entirely for that time. When this pack is used for feeble or very nervous patients, it is sometimes much better to have one or both arms out of the wet sheet, but well wrapped in the blanket to prevent chilling. The feet must be warm before the pack is applied. If it is found that they do not warm up in the pack, they may be left out in succeeding treatment until the entire reaction is greatly improved. But they must be wrapped in the blanket. The pack must not be applied unless the body surface is warm, else reaction and benefits will not follow its use.

Body Warmth Before Wet-sheet Pack

Sometimes it is very beneficial to heat the skin before applying the wet-sheet pack, so that reaction will take place at once. This heating may be done by means of a hot full bath or a hot-blanket pack. This procedure is especially to be recommended for acute kidney disease (nephritis) but, when the wet sheet is applied, it should be wrung dry, care must be taken to wrap the patient very snugly, and perspiration must be vigorous. Care also is necessary to prevent chilling when the pack is terminated in this case—but for that matter in all cases.

If reaction is greatly delayed, it is sometimes beneficial to place hot-water bottles (filled only with moderately hot or warm water) at the patient's feet and sides. This procedure should be employed only when absolutely necessary. A better way to stimulate reaction is to apply moderate friction outside the coverings, chiefly upward friction to the extremities.

The face and neck should be wet with cold water before the pack is applied, and, if the patient will permit, the hair and scalp also should be thoroughly wet. A towel or a napkin of cheesecloth wrung from cold water should be placed over the patient's face and rewrung from cold water every ten minutes or so during the pack. This should extend over the head or around the neck, if the hair has not been wet.

Duration of Wet-sheet Pack

The duration of the pack will be governed by the effect desired. *Tonic effects* are produced when a comfortable sensation of warmth has developed, indicating that reaction has taken place. This usually requires twenty minutes. *Stimulating* or heating *effects* are secured when the pack is continued only until perspiration begins. *Elimination* takes place during perspiration; hence for this effect the pack may

continue for an hour or two, or even for so long as the patient continues to perspire, providing an exhausted or greatly weakened condition is not produced. To aid in increasing the eliminative effects of the pack additional blankets may be placed over the patient, or a rubber sheet may be placed between the dry sheet and the blanket and wrapped about the patient between these two layers. The sweating may be increased and extended if the patient drinks water freely during the pack.

A patient taking a wet-sheet pack must expect a temporary chilly sensation unless there is fever. This sensation disappears within from five to fifteen minutes if the pack is applied properly, and the patient then feels thoroughly comfortable. Nervousness present before the pack is applied may be somewhat increased for a time, or it may be produced when it did not exist immediately before; but it soon gives way to a soothed, restful feeling that may induce sleep. The brain conditions developed during the pack after reaction sets in are those that develop during normal sleep; hence the sleep produced by this means is invigorating and refreshing. The wet-sheet pack has four distinct stages, which depend upon the duration of the pack and the patient's general condition.

Cooling Stage of Wet-sheet Pack

1. The *cooling stage,* during which there is a rapid loss of heat. Every organ and nerve center is stimulated, and these respond in such a way as to increase the heat-producing power of the body, thereby overcoming the cooling effect of the cold sheet. In case of fever, pronounced reduction of temperature may be brought about by replacing the first wet sheet with another freshly wrung from cold water before the stage of reaction has set in—within ten minutes or so.

Neutral Stage

2. As soon as the temperature of the coverings has been raised to that of the body the *neutral stage* begins and heat begins to accumulate. This stage is quieting and soothing and produces a drowsy feeling that may lead to sleep. If the pack terminates here the effects will be those of a neutral full bath.

Heating Stage

3. The *heating stage* begins when the heat has accumulated sufficiently to raise the body temperature slightly, the effects being due to the fact that heat elimination is progressively decreased. This stage is observed by the attendant in the flushed face of the patient. Unless the hair has been wet or

a cold wet towel placed about the head and face, the patient is likely to become nervously excited. If the pack is continued for some time in this stage with. for some reason, the next stage not developing, the patient will be weak, faint and enervated, as occurs after a prolonged hot full bath.

4. The *sweating stage* is ushered in by the appearance of perspiration upon the forehead of the patient, and is due to the accumulation of heat to such an extent that the skin and sweat glands become markedly excited and active. The elevation of temperature prior to this stage activates every cell and nerve center in the body, and toxins are rapidly eliminated and destroyed. The increased rate of heart-beat and the large amount of blood circulating more rapidly in the skin greatly aid in the rapid loss of tissue toxins and elimination of nitrogenous wastes.

Sweating Stage

Any stage of the wet-sheet pack may be prolonged, as desired. If some of the covering is removed, or if a fresh cold sheet is applied at the end of from seven to ten minutes, or before reaction begins, the first stage may be prolonged. This is advisable in some cases of fever. If the patient lies in the center of two single blankets which are then wrapped securely about him, it is only necessary, when the sheet is to be changed, to open these blankets. There is no unrolling of the blanket as is necessary with the method of application first described. This stage may also be prolonged by sprinkling the sheet over the chest, or rubbing it from top to toe with ice, rearranging the warming blanket as before.

To prolong the second stage considerable of the covering should be removed when satisfactory reaction has taken place. This must, however, be removed uniformly, so that no part is over-protected or under-protected in comparison with the remainder of the body, and the sheet must be left as first applied close about the body.

Prolonging Sweating

To prolong the third stage only a small amount of the covering should be removed, with almost continuous bathing of the head and face with cold water, with or without a cold towel about the neck. This treatment holds the sweating in check. Having the patient drink a glass of water every twenty to thirty minutes of the pack will prolong the fourth stage. Plain hot or cold water, preferably hot, may be taken,

or it may be flavored with lemon or other unsweetened fruit juice. If necessary additional blankets may also be placed over the patient. It is during the fourth stage that elimination is secured, this being the most valuable effect of the pack. Every stage is valuable in itself, however, and the first three are necessary to secure the fourth.

From the foregoing the reader will understand that the wet-sheet pack can be utilized in a considerable variety of diseases and disorders. In cases of fever and insomnia, and for the elimination of blood and tissue poisons and wastes, it is particularly valuable. The pack continued only to the tonic (second or neutral) stage is excellent in cases of anemia, neurasthenia, gastric neuroses, and chronic gastritis, constipation, diabetes, melancholia, acute mania, epilepsy (between attacks), chorea, and all wasting diseases. Continued well into the heating stage it is a very serviceable procedure for preparing one for some cool or cold (tonic) application. It is useful in the stage of eruptive fevers in which the skin is hot and dry and with the eruptions only beginning to show, having been used with excellent results in the early stages of smallpox, measles, scarlet fever, and other eruptive diseases. The sweating stage may be employed in practically all cases in which sweating is indicated, except for those individuals whose vitality is too low for reaction, in eruptive fevers after the eruptions have become well developed, and in eruptive skin diseases. Other conditions in which the wet-sheet pack is very useful are cancer, carbuncle, inflammation of the breast, acute bronchitis, uremic coma, diphtheria, erysipelas, glanders, inflammation of the glands, gout, hay-fever, hectic fever, hives, hydrophobia, impetigo, infantile paralysis in the early stages, influenza, arthritis with fever, acute Bright's disease, gangrene and dropsy of the lung, malaria, the fever of peritonitis, acute pharyngitis, bubonic plague, pleurisy, pneumonia with fever, prickly heat, after ptomaine poisoning, in puerpural fever, purpura, relapsing fever, rheumatism, skin diseases, syphilis, tonsilitis, acute tuberculosis, and uremic convulsions with fever.

Uses for Wet-sheet Pack

There are numerous conditions in which the wet-sheet pack is beneficial, but in which local protection against the cold sheet is necessary. For instance, in case of nervous heart or

Wet-sheet Pack, Precautions

easily excited lungs, especially in asthma, a dry towel or piece of woolen flannel should be placed in direct contact with the skin, over the heart region or (in asthma) over the entire chest. The pack is then applied otherwise as directed. When there is a hyperesthesia of the skin, whether or not there are internal symptoms aroused by the skin irritation, it may be necessary to cover the skin of the hyperesthetic areas. These areas usually comprise part or all of the spine and part or all of the abdomen. Dry flannel over such areas before the patient is wrapped in the pack will prevent disturbance. The feet may be left out of the pack without reducing its value, providing they are kept warm by flannels, hot-water bottles, or other means.

Many times it is well to train the individual for the wet-sheet pack before applying it as first directed. One may start with very narrow packs and gradually extend them until they include the entire body; or the entire body may be enveloped in blankets as directed, but with wet sheeting or a wet towel to only a small area, which is increased from day to day—perhaps (and better) starting with the abdomen, then including the back, then the lower extremities, then the upper extremities, finally the entire body.

Partial Wet-sheet Packs

Indications that the pack has been continued too long and the circulation too much stimulated are headache, excitability or nervousness, fainting, and dizziness. In such cases perfect rest and plenty of warmth are necessary, and greater care must be taken with future packs.

If sleep comes to the patient in the pack, it is well to permit it to continue until it is time to terminate the treatment. The time for this, of course, will depend upon the effects desired. When certain effects are sought, it will become necessary to terminate the sleep in order to remove the pack at the proper time. But sometimes it is well to let the patient sleep even for hours, especially in some cases of insomnia. If overheating is guarded against by the removal of part of the covering or the occasional wetting of the face with cold water, and precautions are also taken against chilling, the protracted sleep will be very restful and refreshing. In stubborn cases of insomnia that fail to respond to other measures, this pack is most effective.

Sleep in Wet-sheet Pack

WET-SHEET RUB.—This hydriatric procedure consists in rubbing the body thoroughly while it is wrapped in a wet sheet. It is an application perfected by Priessnitz, and has been used with very excellent results for many years.

Wet-sheet Rub

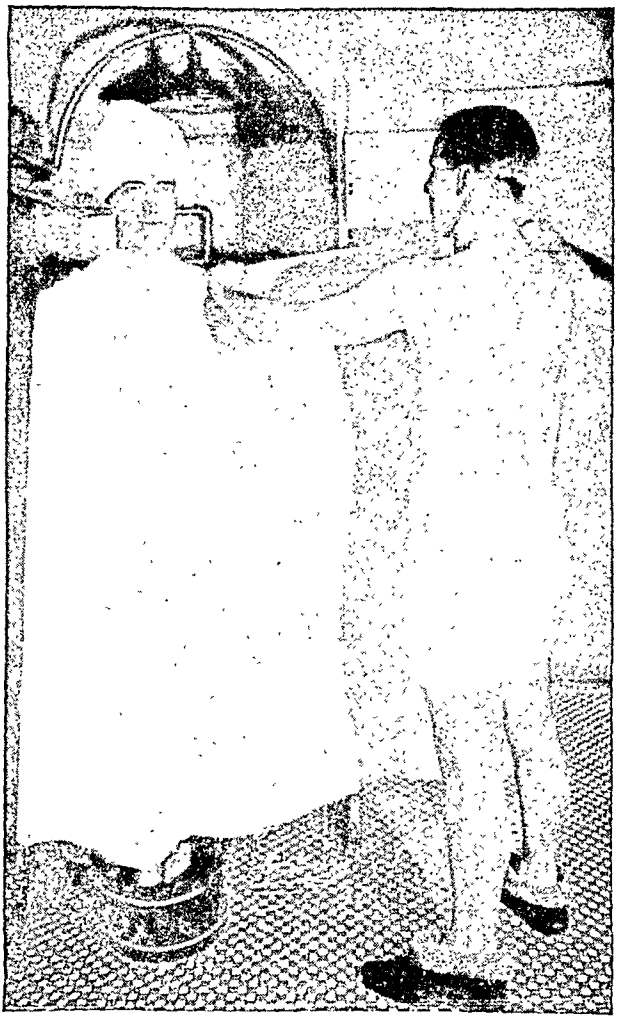
The patient, with skin warm, standing in a foot-tub of water at from 100 to 106 degrees, is wrapped from neck to feet in a sheet that has been wrung from water at a temperature selected according to results or effects desired, the head being cooled by wetting the hair, or by wetting the face and putting on the cold turban. While two attendants are wringing the sheet from water at hand, the patient is standing in the foot-bath, wrapped in a dry sheet. The dry sheet is removed and the wet sheet is then quickly unfolded and tucked in the right hand, the left hand holding one corner, which is applied to the patient's side immediately beneath the upraised arm. The patient lowers the one arm to hold the sheet, which is carried on around the body to be held by the other lowered arm. The sheet is then carried on across the body and over the first shoulder, fitted about the neck and over the other shoulder, thus enveloping the entire body except the head and the feet, being tucked in well between the legs, which close tightly together to hold it. The sheet is drawn and kept close to the patient's body, for the rubbing that immediately follows the enveloping is done with the hands of the attendant or attendants *over* the sheet, not *with* the sheet. Not over five to eight seconds should be required to apply the sheet properly. In any case it is done as quickly as is compatible with having it applied correctly. The rubbing requires from one to three minutes.

Applying Wet-sheet Rub

Every part of the sheet is rubbed vigorously until all parts of it are warmed, indicating complete reaction and warmth of the body beneath. The rubbing should be as vigorous as the patient can tolerate with comfort, with percussion over fleshy portions if desired; but parts that are sensitive to rubbing may be gently patted instead. Since the sheet is applied quickly, and the friction applied vigorously over and over to all parts of the body until full warmth is established, this application requires a strong attendant, as it is very tiring to him. It is better, in fact, that there should be two attendants, one rubbing the trunk and arms, the other the hips and legs.

Wet-sheet Rub, Vigor in Rubbing

Very feeble patients may be treated while reclining in bed, providing their feet are heated during the procedure. The patient lies upon or is placed upon the wet sheet, which then is applied in much the same manner as for the standing patient, and the friction is given as directed above.



Wet-sheet Rub for Invalids

The wet-sheet rub requires one or, better, two attendants. The patient stands in a foot-tub of water at from 100 to 106 degrees and then various applications are administered by the attendants. The rubbing requires from one to three minutes.

Governing the intensity of the bath are several factors: the water temperature, the wetness or dryness of the sheet, its thickness, the number of sheets used in succession (sometimes more than one is used, the change being made as soon as one becomes warm), the degree of friction, the length of the application.

The wet-sheet rubbing is one of the most satisfactory tonic procedures to use following some heating bath or application, but for greatest tonic effect quite cold water and vigorous friction should be employed. By means of this application, adjusted according to the factors mentioned above to suit the individual case, most of the effects of all water treatments may be secured.

Uses for Wet-sheet Rub



Every part of the sheet in the wet-sheet rub is rubbed vigorously until all parts of it are warmed, indicating complete reaction and warmth of the body beneath.

Tonic Baths for Women

It is of value in all congestive conditions of the brain, chest, abdomen or pelvis, if pain is not pronounced, and for all the neuroses, diatheses, abnormal blood conditions, and catarrhal conditions. It is of great value, also, in valvular heart disease. It should not be used when there is much pain or skin sensitiveness, or acute inflammation, or when the skin is diseased, as shown by eruption. Otherwise there are few contraindications for the use of the wet-sheet rub. See also *Dripping Sheet.*

Women, Bathing For.—In the main, the general discussion in these past pages of bathing in various forms will apply to men and women alike. The beneficial effects are the same in both sexes, and the conditions for success are identical. But far more often with women than with men it is necessary to avoid extremes of cold water and to employ some of the less severe forms of bathing. Also with women more often than with men very hot applications may be serviceable, but, owing to the greater prevalence of weakness and disorders of the nervous system in women, it is especially important that they obtain the nerve-tonic effect of some bath below body temperature—the tonic bath. Hence, while extremely cold baths may not be as well borne by women as by men, as a rule, yet women in general are in greater need of tonic baths than are men. This must not be

construed as meaning that men may ignore such baths with impunity; it is merely a matter of degree of need, based upon inherent differences in the two sexes.

Many women suffering from functional derangement of the generative system might have avoided, or might do much toward relieving discomfort, pain, and inconvenience by utilizing the invigorating properties of the cold bath. There is no single measure that will maintain normal functioning or correct abnormal functioning of any part of the body; but nothing, except perhaps exercise, is more conducive to functional regularity than the tonic bath. It favors normal circulation by aiding in overcoming congestions and local anemias; it aids in restoring the blood to a normal condition by bringing into the circulation additional blood cells; it tones up the nervous system, thus making less likely or less severe the numerous forms of nervous weakness; it is of the greatest value in the treatment of neurasthenia, hysteria, and other derangements of the nervous system in females. The "change of life" ceases to be a dread, or a period of discomfort or melancholia, when the tonic bath has been made a daily practice. In fact cold baths properly taken are among the most powerful remedial agents known for the functional disorders of women.

Bathing and Women's Disorders

Of greatest concern to most women interested in tonic bathing is the effect that daily cold or cool baths will have upon the menstrual function. Many women are fearful of the effects of cold baths, or of any kind of bath, taken during menstruation or shortly before or after these periods. There is some justification for this fear; but it is not because the bathing is inherently harmful. The individual condition must govern the nature of the baths taken, both as to kind and temperature. The frail, delicate woman who is not used to bathing, or to cold bathing, must not experiment with bathing during the menstrual epoch. But by employing progressive tonic baths between periods and thereby cultivating reaction a condition can be developed that will permit not only bathing but cold bathing during menstruation. The question of advisability of cold baths at this, as at any other time, depends upon perfect reaction. Safety lies in perfect reaction; danger often lies in imperfect reaction. Great judgment should be

Bathing and Menstruation

sed in this matter, for some women think that they can take old baths with impunity while menstruating when they really hould not do so, and considerable harm may be done if they do.

Cold bathing produces an internal congestion. This is temporary when reaction is normal, but may continue for some time when it is delayed or defective. Many of the disorders from which women suffer are due to pelvis congestion, and the added congestion produced by the cold bath *not reacted from* will intensify this abnormal condition, leading, perhaps, to serious disturbances. But even if there is a chronic congestion, the cold bath which is reacted from properly will not only cause no aggravation of the symptoms but will lead to actual improvement. It is only when there is improper reaction, when there remains a feeling of chilliness or weakness after the cold bath, that harm will result from it. Under such circumstances the cold or cool bath cannot be recommended, either during menstruation or at any other time.

Improper Reaction

The majority of women who have practiced physical culture, or who have lived reasonably normal lives for some time take their cool or cold baths daily without regard to the time of the month, making no difference between the few days of menstruation and the remainder of the time. Many even continue their outdoor summer or indoor winter swimming during the catamenia, as if there were no question whatever regarding the wisdom or safety of the practice. When there is full reaction after the water application, with the circulation more active and vigorous than before, then certainly there can be nothing to fear from bathing, even during the menses.

Naturally, in a matter of this kind, where undesired results might have serious consequences, one should choose the safe plan. If reaction is uncertain, or if it is known to be defective, then bathing, especially cold bathing, should be avoided during these periods. This is particularly true when one is a beginner with tonic bathing, though in time such reaction should have been cultivated that the pleasure of the bath at this time need not be denied any woman.

Bathing during Pregnancy

During pregnancy and lactation only moderately cold or cool water should be used by most women, but very vigorous women who have been taking tonic baths for a long time may in some cases continue the practice during the early stages of

pregnancy. All forms of the percussion bath also should be avoided during pregnancy and lactation. The interior reactions from these forceful applications to the skin are somewhat complex, and occasionally they produce serious disturbances at such times when not very accurately applied.

EXERCISE AS A CORRECTIVE MEASURE

NOT only is exercise necessary for the maintenance of health and the building up of a shapely and capable body, it has also, in many instances, a specific curative value. There are a number of deformities—sometimes congenital, sometimes acquired through bad physical habits, and sometimes the aftermath of disease—for which exercise, in conjunction with other curative measures, has to be specially prescribed.

Effects of Exercise

The effect of exercise in such cases is two-fold: In the first place, it improves the general tone of the body. When one who has not been in the habit of exercising begins to do so, he will soon note that his body is working better; he feels more energetic, and his strength and appearance improve. Appetite and elimination are both stimulated by exercise, and, in general, the patient sleeps more soundly and awakes more refreshed. As regards bodily weight and symmetry, exercise of any kind is a normalizing procedure, as has already been explained. The fat person reduces, the thin person builds up, and deformities are gradually modified and corrected.

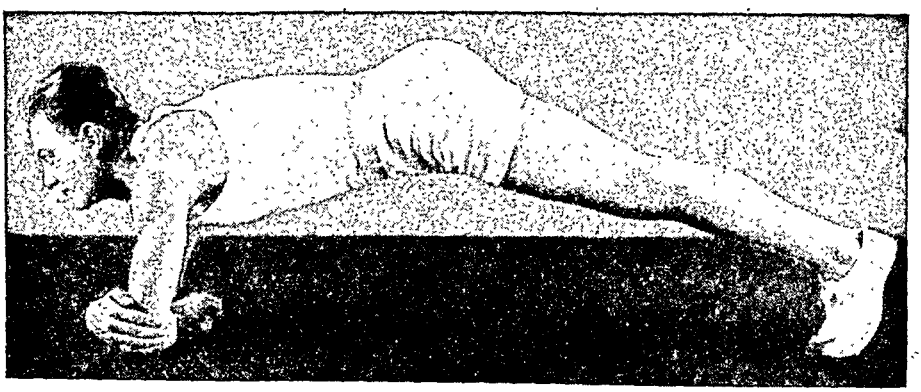
Correcting Causes of Deformities

In the second place, where there is a special deformity of a part, there is a weakness or lack of control in the muscles of the part. Exercise acts directly on such muscles, and, in strengthening or correcting them, lessens or removes the deformity. By exercise weak muscles are strengthened, short ones are stretched, and stretched ones shortened, and the control of all is improved. All muscles have what is known as "tone." There is a slight contraction of the muscle fibers which make them quick to respond to stimuli. If two opposing sets of muscles are not equally well developed, therefore, the general tone of the one set will exert a greater pull on the adjacent joints and bones, and will bring about some kind of deformity. This loss of tone in certain muscles is frequently the result of disease, or of neglect of diet, fresh air, exercise,

and other health-preserving factors. Among the more usual deformities are: *bow-legs,* which generally result from rickets, but which may occasionally be due to over-weight at the time when the child was learning to walk; *chicken-breast,* the result of spinal curvature, rickets, or interference with respiration in babyhood; *clubfoot,* congenital or acquired, usually as the result of infantile paralysis; *flatfoot,* or weakened arches, generally due to improper shoes, combined with bad habits of walking; *hernia,* or rupture; *hollow-chest,* due to lack of vitality and poor posture; *knock-knees,* caused by weakness in the leg muscles, aggravated in many cases, by overweight; *paralysis; prolapsus; uneven shoulders; spinal curvature;* and *strabismus,* popularly known as crossed eyes, and other eye troubles.

Before prescribing special exercises for deformed parts it is necessary to know what the contributing causes are and to correct these. Naturally nothing can be done if the conditions which created the deformity are allowed to persist. Deformities which have been caused by rickets or aggravated by overweight call for careful regulation of the diet. Deformities resulting from poor posture, and general low vitality, call for measures to stimulate and build up the body. In case of flatfoot or broken arches, the improper shoes, which cause or per-

Deformities from General Bad Health Conditions



A form of corrective exercise bringing into play the muscles of the upper abdomen, also the muscles of the chest and those of the upper arms and shoulders. The exercise is begun lying prone upon the floor with the arms folded beneath the chest and the hands clasping elbows as illustrated. The entire weight is raised completely and supported by the elbows and feet, as shown, the complete movement being repeated as often as endurance permits. This exercise may be used in overcoming chicken-breast and lack of muscular development of the chest.

petuate the trouble must be thrown away. Sometimes a deformity in one part of the body will be a kind of compensation for a less obvious defect in some other part. Spinal curvature, for example, shows itself in uneven shoulders, chicken-breast, etc. Some deformities—especially eye troubles, and deformities resulting from poor posture—are due to undue or long continued strain on some part of the body in certain occupations. The clerk may grow hollow-chested. The postman may have uneven shoulders. In such cases if the occupation cannot be given up, conditions and exercises which balance the particular strain must be worked out.

Deformities Caused by Disease

The most difficult deformities to deal with are naturally those which have been the result of some disease like infantile paralysis or tuberculosis. Some of these could be corrected if taken in time, but, when the deformity has persisted, and the whole process of growth has been adjusted to it, the process of correcting the difficulty through exercise is slow, and in some cases only partial correction is possible. Paralysis may be corrected, in whole or in part, if the nerve centers in the affected part are not entirely dead. Exercise, carefully prescribed and scrupulously and patiently continued, will sometimes stimulate the dormant nerve centers, especially if these exercises are begun as soon as possible after the deformity appears.

Mechanical Appliances as Aids

In connection with corrective exercises and general health-building measures, special appliances are often used to keep the deformed part in the proper position until it is able to maintain that position of itself, or to provide an artificial preventive for the strain which the deformity may be putting on associated parts of the body. Braces are worn for bow-legs. In the case of clubfoot, the foot is taped or corrective shoes are worn. Arch-supports are sometimes prescribed for flat-foot. Various supports are used in the case of hernia. In connection with all artificial appliances of this sort, every effort must be made to build up the general vitality of the body and to provide such exercise and stimulation of the affected parts as will lead the body to do for itself what the braces or supports are accomplishing. If the stimulation cannot be given by exercise, massage or other mechanical manipulation is often employed.

Corrective exercises, except in a few instances, are not unique or peculiar movements, but are merely ordinary movements given in a special way. The construction of the joints limits the number of movements that can be made, and those which are possible must be modified and combined as necessary in order to constitute corrective exercise. In many deformities certain muscles are paralyzed so that they exert no pull whatever. The opposing muscles may then exert such a pull as to produce marked deformity, such as the various kinds of clubfoot, twisted arms, or extreme spinal curvatures. Naturally, such contracted muscles need relaxation more than exercise, though a moderate amount of the latter is valuable for improving the circulation and preventing them from losing tone. In these cases the chief attention is given to the weakened or paralyzed muscles, passive exercise being used if active is impossible, while anything else indicated to remove the causes of the trouble is also done. All cases may not be completely correctable, but improvement is always possible.

Aim of Corrective Exercises

There may be some cases, especially of compound spinal curvatures, in which it will be best to avoid certain movements entirely, but as a rule the corrective exercises are merely added to general exercise. The latter are required for their physiological benefits and for maintaining general symmetry, and the former for building up the weakened muscles which have permitted the deformity to develop.

The method of taking the exercises is the important point. All the general rules for exercising apply to corrective movements as well as to general ones; but with the former it is particularly important that the exercise be performed exactly as prescribed and that it be carried to the fullest possible extent. A little twist of an arm or a leg, a change in the position of the feet, or a change from the standing to the reclining position, may make a lot of difference in the specific effect of an exercise upon a muscle or group of muscles. The following rules also apply to the use of corrective exercises.

Method of Taking and Giving Mechanical Exercises

All movements should be performed rather slowly for the sake of both accuracy and concentration. If performed in a hurry when the control is imperfect, the effect may be quite different from that intended. Carelessness in regard to posture and exercise are often responsible for deformities, and

a continuation of this carelessness will naturally prevent the achievement of the desired results. Of course, after the patient has become very familiar with the special exercises he needs, he can perform them more rapidly, but he should never do them so fast that he cannot give careful attention to each part of the movement. Mental concentration always improves the results from corrective exercise. This is not only because the exercise is performed more perfectly, but because thinking about the part improves the circulation in that part and the mental effort creates a demand for better nerve action. Cases are on record in which the use of paralyzed limbs was recovered by exercise when it was necessary to make a start by merely thinking about moving the part even though no actual movement resulted. This is concentration plus suggestion and is of the utmost value when using corrective exercises.

Concentration in Corrective Exercises

The frequency with which the exercises are performed will depend upon the patient's strength and reactive powers. Usually they are taken one to three times a day, in addition to whatever general exercise may be indicated. Comparatively light movements, such as foot exercise, can be taken more frequently than heavy movements such as the exercises on the slanting board for hernia. The patient must always be guided by his feelings. If it is a great effort for him to take the exercises, he should go more slowly and take them less frequently, even though the movements are light. The energy consumed by the exercise depends not only on the amount of physical resistance, but on the amount of mental effort required. One should not be lazy, but neither should one overdo. Overexertion may be detected even before actual fatigue is felt, by the fact that the movement is not being performed so perfectly. In some conditions sensation is less acute so that fatigue is not noticed as it would be normally, while in other cases it may be well to stop, even though there is actually no fatigue as ordinarily experienced. This applies particularly to conditions of partial paralysis. When the nerves are not greatly affected, the exercise should be continued to the point of moderate fatigue in order to bring about the desired muscular development. It is well to follow each period of corrective exercise with a period of rest, the length depending on the

Frequency of Corrective Exercises

patient's reactive powers but always continuing until there is a desire to resume activity.

Rest and Relaxation Important

The importance of rest and relaxation in securing results from exercise has been fully discussed elsewhere, but it will be well to emphasize their importance still more in relation to corrective exercise. In practically all cases requiring such treatment there is a lowered vitality, and so the nerve-energy must be conserved and every opportunity given the body to build more. When certain muscles are abnormally contracted, results will be poor until they have been relaxed. In such cases conscious relaxation of the part affected will then be indicated, as well as general rest and relaxation. The subjects of relaxation and recuperation from muscular effort are treated at length in Volume III, Section 1. The statements made in the description cited on the general constitutional effects of exercise apply with equal force to corrective exercise, as discussed in the present section and elsewhere.

Right Living Necessary

It is also necessary, if the best results are to be secured, to combine the corrective exercises with every phase of right living. Many people, having heard that certain exercises are good for a spinal curvature, take the exercises, but neglect to correct their diet and to get more fresh air and sleep. Then they wonder why they do not get satisfactory results. Exercise educates the muscles and creates a demand for their development, but this development can take place only when the proper conditions are created through general right habits of living. Those who expect to recover from any abnormal condition by exercise alone will be disappointed. If lack of exercise has been one of the chief causes of their trouble, the addition of the proper muscular activity may make a marked change, but the effects will not be complete and permanent unless all the laws of health and right living receive due attention.

For exercises to overcome specific deformities see *Bow-legs; Club-foot; Flatfoot; Paralysis; Rupture; Sight, Disturbances of; Spinal Curvature* (under *Spine, Diseases of*) in Volumes VII and VIII; also discussion on *Increasing Height* under *Traction* in Section 7 of this volume.

Special Exercise Treatments.—The treatments here discussed are illustrated and described in detail throughout this section.

This mode of treatment is a combination of general bodily

manipulation and resistive exercise. It includes a great variety of movements designed to reach all parts of the body. Sometimes manipulation may be administered without exercise, sometimes it is given locally instead of generally, and there are always variations which may be utilized to meet special needs. The full description accompanying the many illustrations will reveal the possibilities of this form of manipulation.

Purposes of Corrective Exercises

The purposes of these treatments are to improve the blood and nerve supply to all parts of the body and to develop the strength and tone of the tissues necessary to retain this improved function. These effects are brought about in various ways. The manipulation of the joints increases their mobility, and this always improves the blood and nerve supply to the surrounding parts. The blood-vessels and nerves which pass a joint lie close to the bones and to the surface, and any stiffness or abnormal deposits about the joint will cause some pressure upon them. Manipulation of the joints not only helps to overcome and prevent this abnormal pressure, but through the stretching of the nerves greatly stimulates their action. Increasing the mobility of a joint involves stretching any tightened ligaments and also strengthening and restoring tone to relaxed and shortened ligaments. A joint works normally when its supporting ligaments are normal, so that movement can be free but controlled. It is possible for a joint to be so movable that it tends to dislocate easily but with proper manipulation this should not result, because the tonic effects of the treatment, especially the exercise, make the ligaments strong as well as flexible.

A joint which is in normal condition is not easily displaced. If displacement occurs, the elasticity of the ligaments tends to draw it back into place, especially if a little assistance is given in the form of stretching. Many people have had the experience of dislocating a finger joint and replacing it by merely pulling upon it. Thus it will be seen that proper movements help greatly in replacing any bones, ligaments, or muscles which may be slightly out of position. This is especially true of the spinal vertebrae.

Normal functioning of the organs depends upon their receiving a normal blood and nerve supply, and by manipulating and exercising the parts adjacent to affected organs

and to the nerve-centers in the spine which govern these organs, great improvement can be brought about. The right sort of movements particularly are valuable for the heart, liver, and intestines, but all the organs are favorably influenced. There is not a part of the body that will not be benefited, including the brain, which is, of course, dependent upon a good blood supply.

These corrective exercises can be used by both the sick and the well. They are preventive as well as corrective. The treatment not only keeps them young and supple, but is pleasant to take and is followed by a feeling of general well-being. It is not like a medicine, to be taken when sick and avoided when well, but is a health-building measure that may be employed at any time and should be employed at least twice a week by healthy persons. It is not necessary that all the movements be used, but each part of the body should receive some attention.

Preventive and Corrective Exercises

A simple test will soon convince anyone of the remarkable effects of such manipulation. With the right hand, bend and twist all the joints of the left hand from the tips of the fingers back to the wrist. Carry each movement to the fullest extent possible, and put on a little extra pressure at the point of greatest bend or twist, so as to stretch the ligaments thoroughly. Repeat each movement several times. When finished notice how light, free-moving, and generally competent the hand feels. These effects will be particularly noticeable if the manipulation is performed after one has been using the hand for typing, playing the piano, or similar activities.

This form of treatment is very valuable in spinal curvature for the reason that it combines manipulation with exercise, and develops the muscles which hold the spine in normal position. Other forms of spinal manipulation do not do this. The movement required to force the spine into its normal position will, if resisted by the patient, develop the muscles which hold the bones in place. Full instructions for the treatment of spinal curvature will be found in Volumes VII and VIII.

Corrective Exercise and Spinal Curvature

Proper movements are of value even in paralysis. Here the stretching of the joints intensifies the good effects of exercise. As soon as active exercise is possible, the resistive move-

Corrective Movements for Paralysis

ments will hasten results, for they require the patient to use mental concentration on the muscles. Then the stimulation of the spinal nerves brought about by the manipulation of the back helps further in restoring normal nerve action.

Corrective Movements for the Foot

A number of the movements for the foot will be found very helpful for weak or fallen arches, and those for the knee may be used in cases of knock-knee, or in bow-legs where the joint is chiefly affected. The manipulation applied to the toe is helpful for bunions. Cases of chronic arthritis, in which the joints can be moved without unbearable pain, are often greatly helped by proper movements. If the patient is not able to take active exercise, manipulation without the resistive movements will soon bring about such improvement that the latter may be added, and this will hasten the time when more active exercise may be employed.

Vigorous corrective movements should not be used when great pain is present, as is often the case in neuritis and sometimes in arthritis. If there is only moderate pain, the movements can be given lightly, increasing the pressure very gradually when stretching the joints. In all acute conditions rest is more important than exercise, and any manipulation given should be limited to the lighter spinal movements. Generally it is well not to use any such treatment until the acute symptoms subside. During pregnancy it is well to avoid any very strenuous stretching of the abdominal region or heavy exercise of this part. A light general treatment may be given to great advantage, however, as it maintains the flexibility of the joints, muscles, and ligaments about the pelvis. The same precautions should be taken during the menstrual period. If there is a profuse flow, however, no treatment, except possibly pressure on the spinal nerve-centers, should be given.

Fitting Treatment to Condition

The extent of the movements and the amount of force employed in their application can be graduated to meet the needs of the young, the old, the weak, the strong, the sick, and the well. The movements may be given slowly when it is desired to relax, or rapidly when it is desired to stimulate. Pressure may be applied gradually or quickly. The amount of resistance offered when giving the exercises may be graduated to a nicety for each part and for each person. The treatment may be made long or short, general or local. By modifying

the severity of treatments they may be used to assist the overweight person in reducing or the person below normal weight in building up.

For example we select the neck, as movements of this part are important. Generally, it is best for the patient to be in the reclining position, especially at first. The movements can be given in the sitting position, but it is much easier for the patient to relax when lying down. The movements used consist of lifting the head as high as possible, so that the chin touches the chest; lifting the head diagonally left and right so that the chin touches the shoulder; bending the head to the sides, left and right, until the ear touches or nearly touches the shoulder; twisting the head to the left and right; stretching the neck by pulling directly backward on the head; stretching the neck while bending and twisting it at the same time; and pressing downward on the head while it is in a lifted position. In other words, the neck is bent, twisted, and stretched in every possible direction.

It is seldom necessary for the patient to relax before the treatment, as the movements themselves are relaxing as well as stimulating. The patient may be told to relax, and if he is inclined to help the operator by using his muscles, he should be told to take his mind from the part being treated. If there is great difficulty in relaxing or if there is some pain, a little massage may be applied to the muscles before beginning the manipulation. The latter should be given lightly and slowly at first. Each movement is executed several times, and the amount of force can be increased slightly at each repetition. The movements must be made smoothly and with a firm touch, as an indecisive touch or jerky movement will cause the patient to tense his muscles.

Corrective Movements for the Neck

The movement of lifting the head may be done by placing the hands under the back of the head, or by crossing the arms beneath it, and lifting. In either case the head is brought up smoothly and steadily, and, when it has reached the apparent limit of motion the pressure is slightly released, after which a brief, firm, fairly hard pressure is applied, so as to stretch thoroughly the muscles and ligaments of the back of the neck. The head is then allowed to return to the resting position.

(*Continued on page 2579.*)



HEAD AND NECK MOVEMENTS. (See descriptions on following page.)

HEAD AND NECK MOVEMENTS.

1. For stimulating the circulation and strengthening the muscular tissues of the neck, this illustration shows a position for effective results. The operator stands behind the patient and places his fingers in front of the patient's neck, the thumbs falling in a natural position at the back of the neck. The thumbs act as a pivot while the fingers are kneading and rubbing the front of the neck, and then the fingers become the pivot while the thumbs work on the back of the neck.
2. In treating the temples for nerve compression, the operator holds his fingers together on the patient's temples, kneading slowly and gently with the finger-tips. This may also be done with the patient reclining.
3. A treatment for the front of the neck, as well as for cervical spine, is shown in this illustration. Great care must be observed in giving the treatment. The operator places the left hand on the chest of the patient and the right hand on the forehead, pressing the head of the patient backward as far as it will go, then giving a short, vibrating, springy motion to the head. Again the caution—use great care.
4. A treatment for the back of the neck also is shown. Here the operator places his right hand on the first dorsal vertebra and the left hand on the top and back of the patient's head, pressing the head as far down as possible without discomfort to the patient. This movement is especially effective in treating the tissues at the back of the neck, and including the cervical spine.

HEAD AND NECK MOVEMENTS *(Continued)*

5. Note the position of the operator in giving a pressure treatment for cervical spine and neck tissues in general. The pressure is directly downward in line with the spine—a sort of telescoping movement. The patient must sit with head erect in order that the operator may exert sufficient pressure.



6. Stretching the neck is a very important movement that must be performed by an operator. The left hand is placed underneath the patient's chin and the right hand at the back of the head, preferably lower on the occiput than shown. The patient is then raised, the weight of the body being sufficient to result in a maximum stretching of the neck.



7. Another movement is that of twisting the head from side to side, the operator clasping the back of the head with one hand and the chin with the other. An upward pull, at the same time rotating the head from left to right and forward and back, will result in considerable stretching of the neck, and also act as a helpful exercise of the neck tissues.











HEAD AND NECK MOVEMENTS. (See descriptions on following page.)

HEAD AND NECK MOVEMENTS (*Continued*).

8. For the stimulation of the nerves and tissues at the back of the neck, the operator rubs and kneads the small area at the base of the skull, using the finger-tips of one hand, while the other hand is placed on the patient's forehead to brace the head.

9. With the patient's head thrown well back, the operator grasps the chin with one hand and the back of the head with the other, then gently twists the head from one side to the other.

10. The best method of pushing the head to the side is shown in this illustration. Standing back of the patient, the operator places one hand on the right shoulder and the other on the side of the head above the ear, pressing the head to the left as far as possible. The operator should release gently, then reverse the movement for the left side.

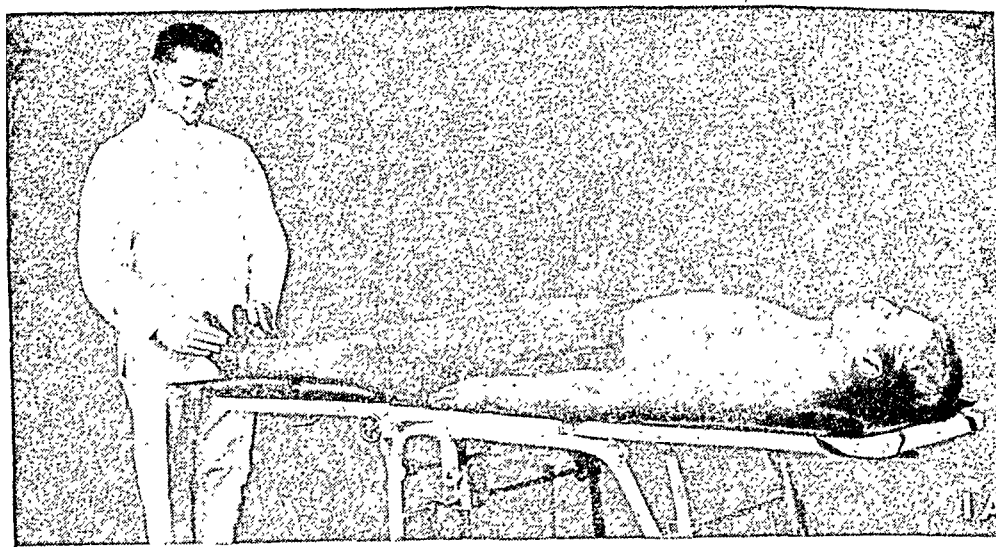
11. Another effective head and neck movement, which, however, must be done gently, is shown in this illustration. With his right hand above the patient's left ear, the operator presses the patient's head well to the right, then, with his left hand under the chin, he twists the chin upward toward the left. Reverse the movement for the other side.

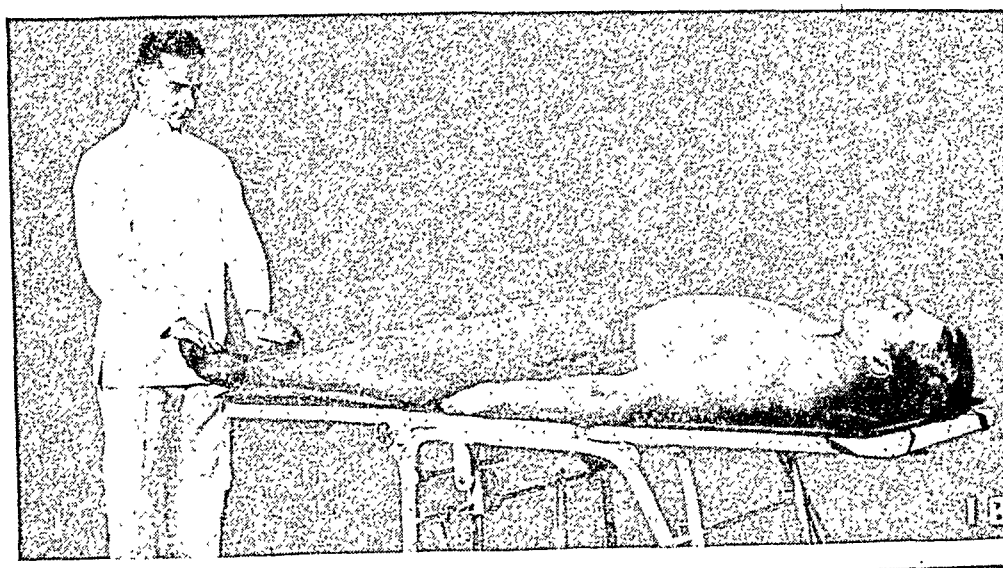
To modify exercises, pressure may be slightly released and re-applied several times before the head is returned to the starting position, making the pressure more strenuous each time. By thus beginning lightly and using the extra pressure at the top of the movement, it will be found that after a few repetitions the head may be lifted considerably higher than at first. It is this little extra pressure at the apparent limit of the movement which is characteristic of physical exercise movements, and which makes them so valuable for increasing the flexibility of the parts and for stimulating the blood and nerve supply to the same region.

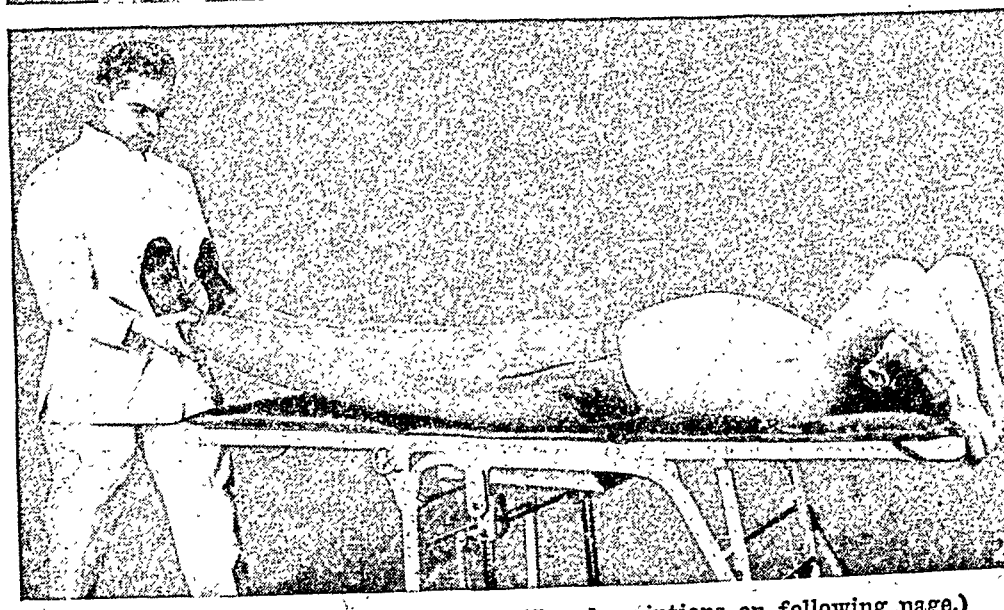
The next movement is performed in the same way, except that the head is turned somewhat to the side. In bending the head to the right, the right hand grasps it beneath the occiput (the backhead), while the left hand is placed on the patient's left shoulder so as to hold it firm. If this is not done, the shoulder will be pulled over also and reduce the neck-stretching effect. In bending the head to the other side the position of the hands is reversed. In twisting the head, one hand is placed beneath the occiput and the other grasps the chin. Care must be taken not to use too much force, as it may alarm the patient. The hands are placed in the same way for the pulling and for the combined pulling and twisting movements.

Corrective Movements Force Undesirable

In giving any neck movements, or in working on or about the face, it is important to watch the finger-tips so as not to thrust them inadvertently into the eyes or ears. Also, watch the finger-nails so that they do not scratch, and in grasping any part of the body, be sure that you do not pinch the skin. Make all your contacts smoothly and firmly and do not let the hands slip on the skin, especially on parts covered with hair, or there will be painful pulling. Always consider the patient, and give the treatment in a manner that will be most comfortable for him, provided this does not interfere with its efficiency. Some well-intentioned operators give violent treatment, regardless of its effects on the patient, because they think they must use considerable force in order to do any good. But it is correct contact and the proper application of force which governs the effectiveness of the treatment, not the force used. *(Continued on page 2595.)*







LEG AND FOOT MOVEMENTS. (See descriptions on following page.)

LEG AND FOOT MOVEMENTS.

1A. Movements for the joints of the ankle and knee, as well as the muscles and ligaments of the leg, are shown in this illustration. With the patient lying flat on his back, his feet close together, the operator grasps the outer sides of the feet and holds them together while the patient tries to spread them apart. The resistance should begin lightly and increase as the patient's strength increases.

1B. In this movement the hands are shifted to the inner sides of the feet and the patient tries to press the feet together, the operator again resisting the movement. Both of these resisting exercises are excellent leg and foot movements.

2. The stretching exercise affects chiefly the ankles, knees and lower extremities. Here the patient, lying on his back, grasps the head of the table, while the operator firmly holds the feet and pulls the legs.

2A. The stretching exercise affects chiefly the ankles, knees and lower extremities. Here the patient, lying on his back, grasps the head of the table, while the operator firmly holds the feet and pulls the legs, turning the feet inward with a twisting motion of the legs. (*See next page.*)

2B. The movement here is the same as that of 2A, except that the feet are turned and twisted outward as they are stretched. This must be done gently with women, or in case of hernia. (*See next page.*)

MOVEMENT FOR HIP-JOINT.

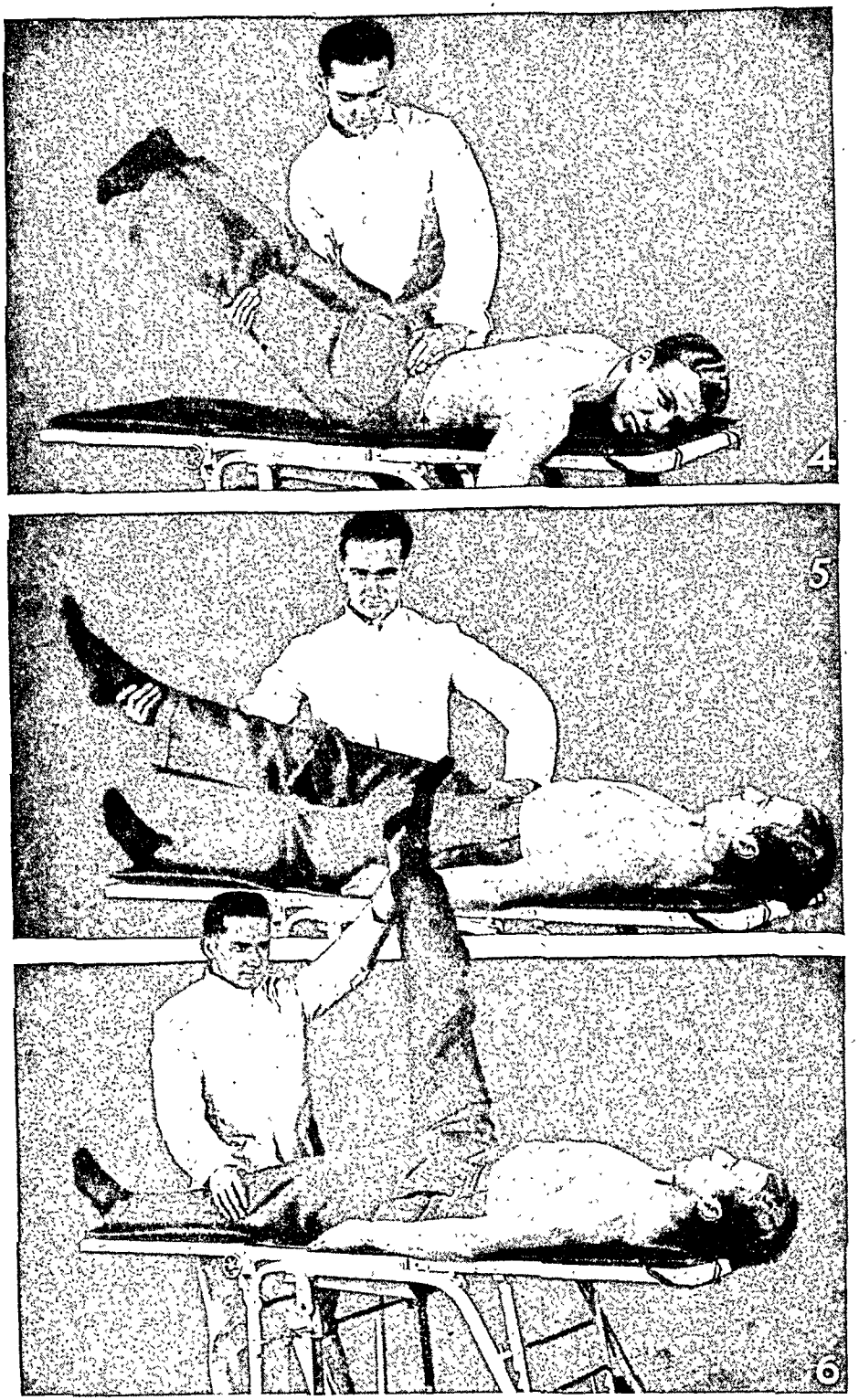
3. This movement is for the hip-joint, and the muscles and ligaments of the hip. With the patient lying face downward, the operator presses on the hip muscles with one hand, and with the other hand grasping the patient's leg by the knee, raises and rotates the leg. (*See next page.*)







LEG, FOOT AND HIP MOVEMENTS. (See descriptions on preceding page



MOVEMENTS FOR LEGS AND LUMBAR REGION OF THE BACK.
(See descriptions on following page.)

MOVEMENTS FOR LEGS AND LUMBAR REGION OF BACK.

(*See preceding page.*)

4. An effective exercise for the lumbar region of the back and, to some extent, the dorsal spine, is shown in this illustration. With the patient lying face downward, the operator holds both legs from beneath with his right arm, and, with the left hand placed on the small of the back, rotates the lower half of the body. Used carefully, it is valuable in lumbar kyphosis; but not in lumbar lordosis (swayback).

5. Another movement for the hip joint, and the muscles and ligaments of the hip, is shown. Here the patient lies on his back, while the operator grasps the right ankle with the right hand, the left hand resting on the pelvic bones. The leg is then raised and extended over the opposite leg of the patient as far as possible. For the other hip, repeat this movement on the opposite side with the other leg.

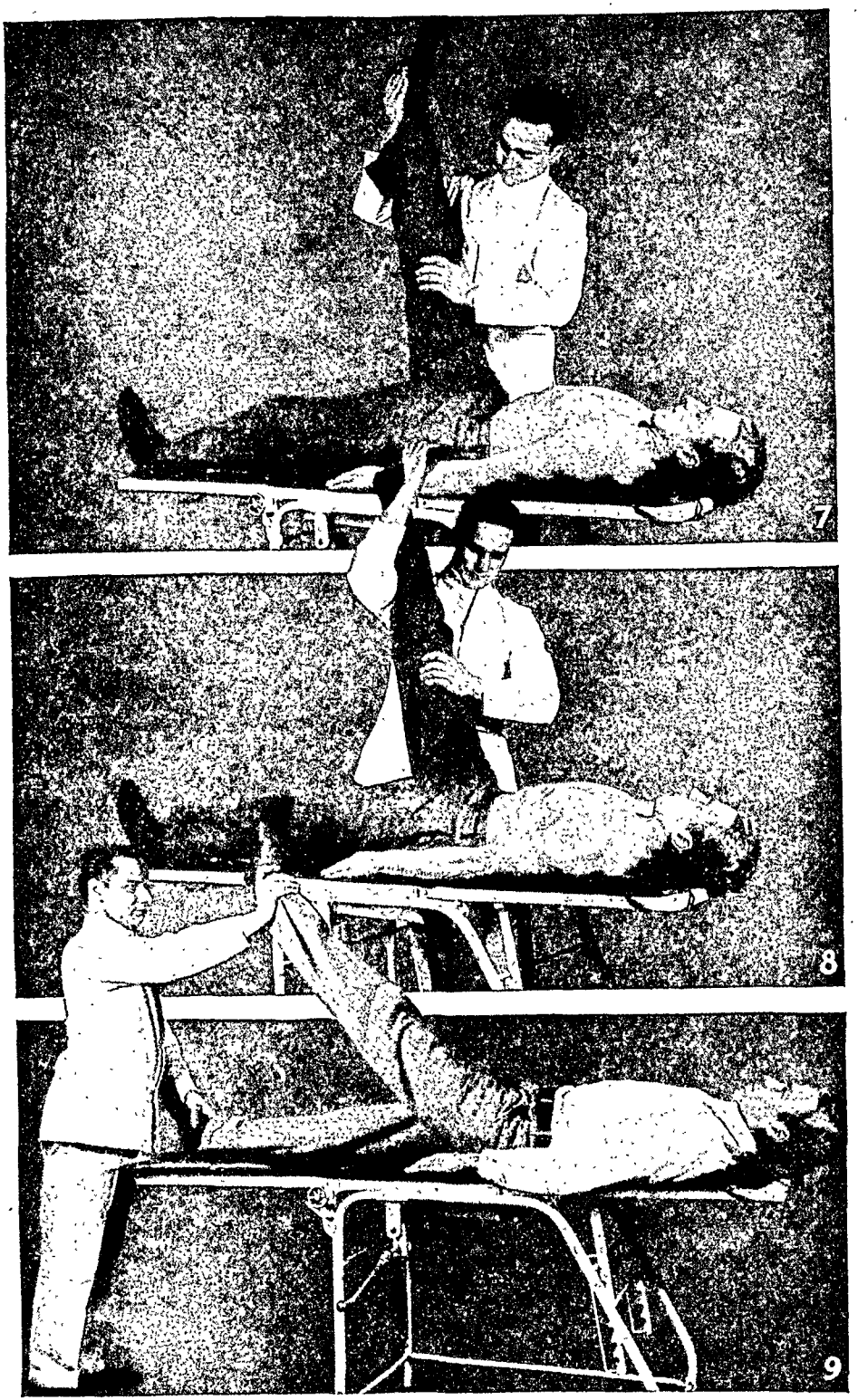
6. Patient lies face upward. The operator holds the knee of one leg and the ankle of the other. The leg is raised straight up with the ankle-hold, the patient keeping the knees stiff. This exercise is excellent for the lower lumbar, hip and abdominal regions.

MOVEMENTS FOR LEGS AND HIPS. (*See next page.*)

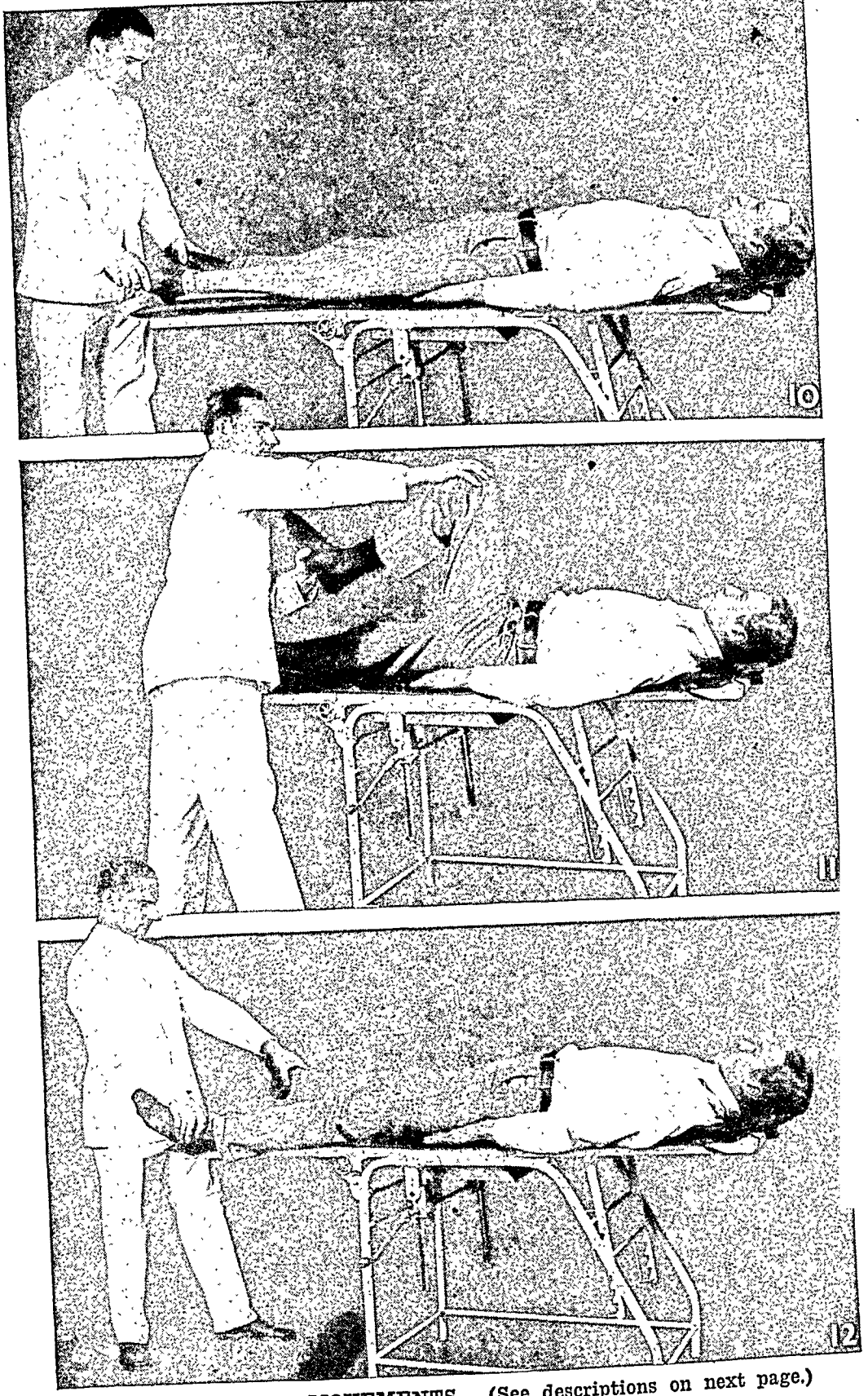
7. Splendid movement for the hip is as follows: the operator grasps the ankle with the right hand and the knee with the left. He raises the leg at right angles to the body and pushes it upward as far as it will go. Rest and repeat several times. Repeat the movement with the other leg.

8. For stretching the sciatic nerve and muscles, a similar position is assumed. With the patient lying on his back as above, the operator raises the leg at right angles to the body and holds the knee with the left hand. With the right hand he grasps the patient's toes and pulls down, being careful to keep the leg stiff.

9. Resistance exercise for the leg is shown in this illustration. This is a simple movement showing the resisting movement with the leg raised as high as possible, the patient pressing downward and the operator resisting. Then the operator places the hand on the upper side of the leg and resists the upward movement. Repeat this exercise with the other leg.



MOVEMENTS FOR THE LEGS AND HIPS. (See preceding page.)



LEG AND FOOT MOVEMENTS. (See descriptions on next page.)

LEG AND FOOT MOVEMENTS.

10. For stretching the muscles and ligaments of the instep, the patient lies on his back and the operator presses moderately hard on the toes. This may be made a resistance exercise when desired.

11. This is an excellent resistance exercise for the entire leg. The lower part of the foot is grasped by the operator, and the other hand is placed on the knee. The patient draws the leg upward, the operator meanwhile resisting, and when the leg has been drawn up as far as possible, the patient presses downward, straightening the leg, the operator again resisting. Repeat this exercise with the other leg.

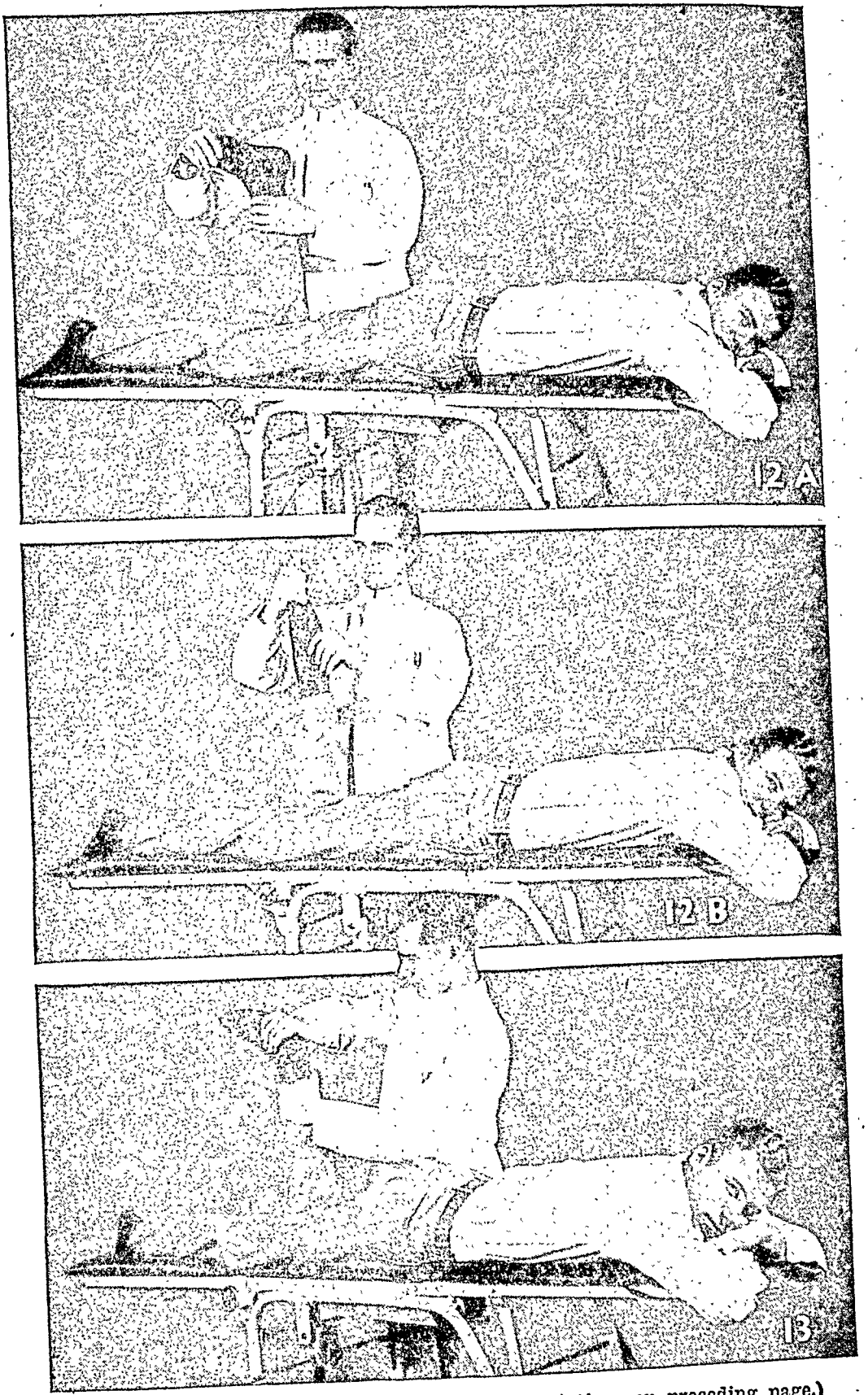
12. In this resistance exercise, the legs are spread as far as possible and the patient tries to bring them together, while the operator resists the pressure, holding the ankles. Care must be taken to avoid much straining in this movement.

LEG AND FOOT MOVEMENTS. (*See next page.*)

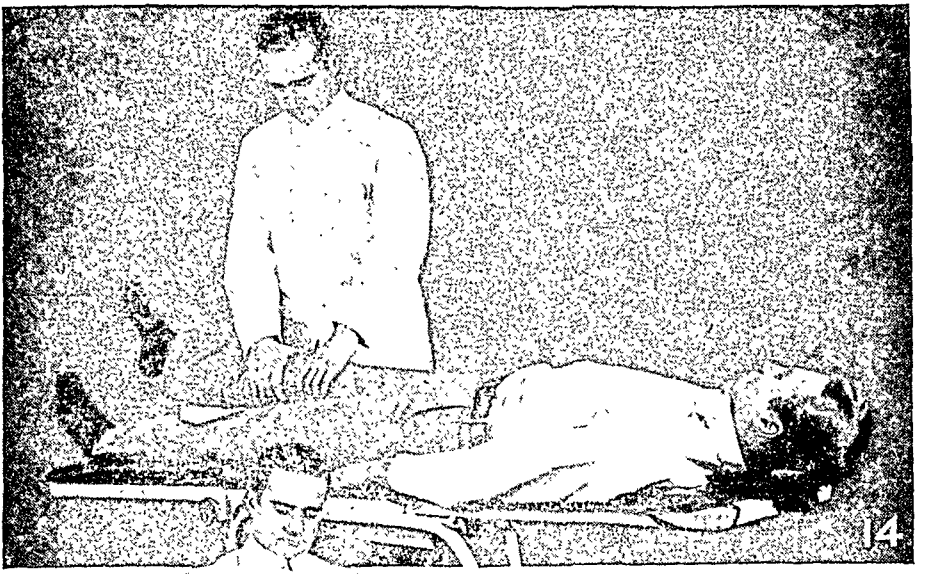
12A. In this movement for the ankle the patient lies prone and raises the leg to a right angle. The operator grasps the leg above the ankle with one hand and rotates the toe with the other, pressing down with the toe.

12B. With the patient assuming the same position as above, the operator presses the foot backward as far as possible, then grasps the toe with one hand, the heel with the other, and rotates the foot in a small circle.

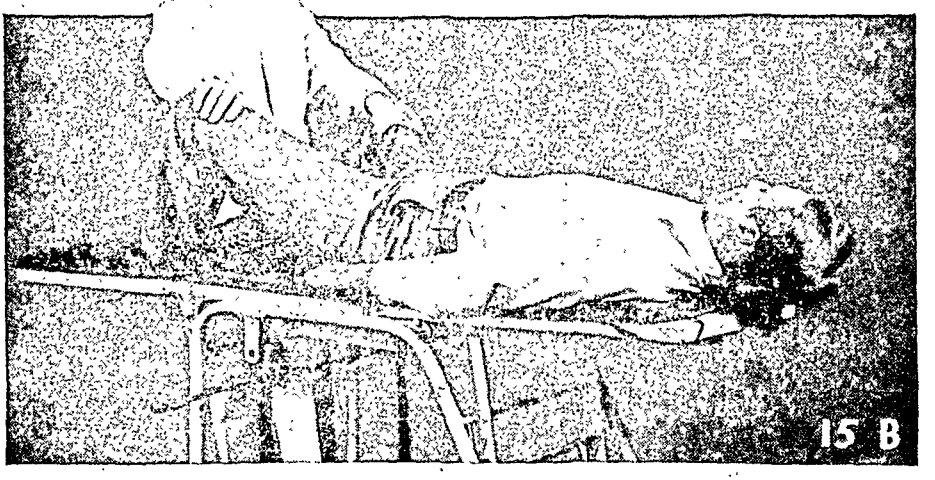
13. In the same position as that described in 12B, the operator grasps the leg just above the ankle with the left hand and the foot with the right hand, bending the foot over sideways as far as possible and rotating in a small circle. Then bend the foot over to the other side and rotate.



LEG AND FOOT MOVEMENTS. (See descriptions on preceding page.)







LEG AND FOOT MOVEMENTS. (See descriptions on following page.)

LEG AND FOOT MOVEMENTS. (*See preceding page.*)

14. This is an excellent position for kneading and working on the leg near the knee-cap. The operator places his knee on the table, resting the patient's leg upon it.

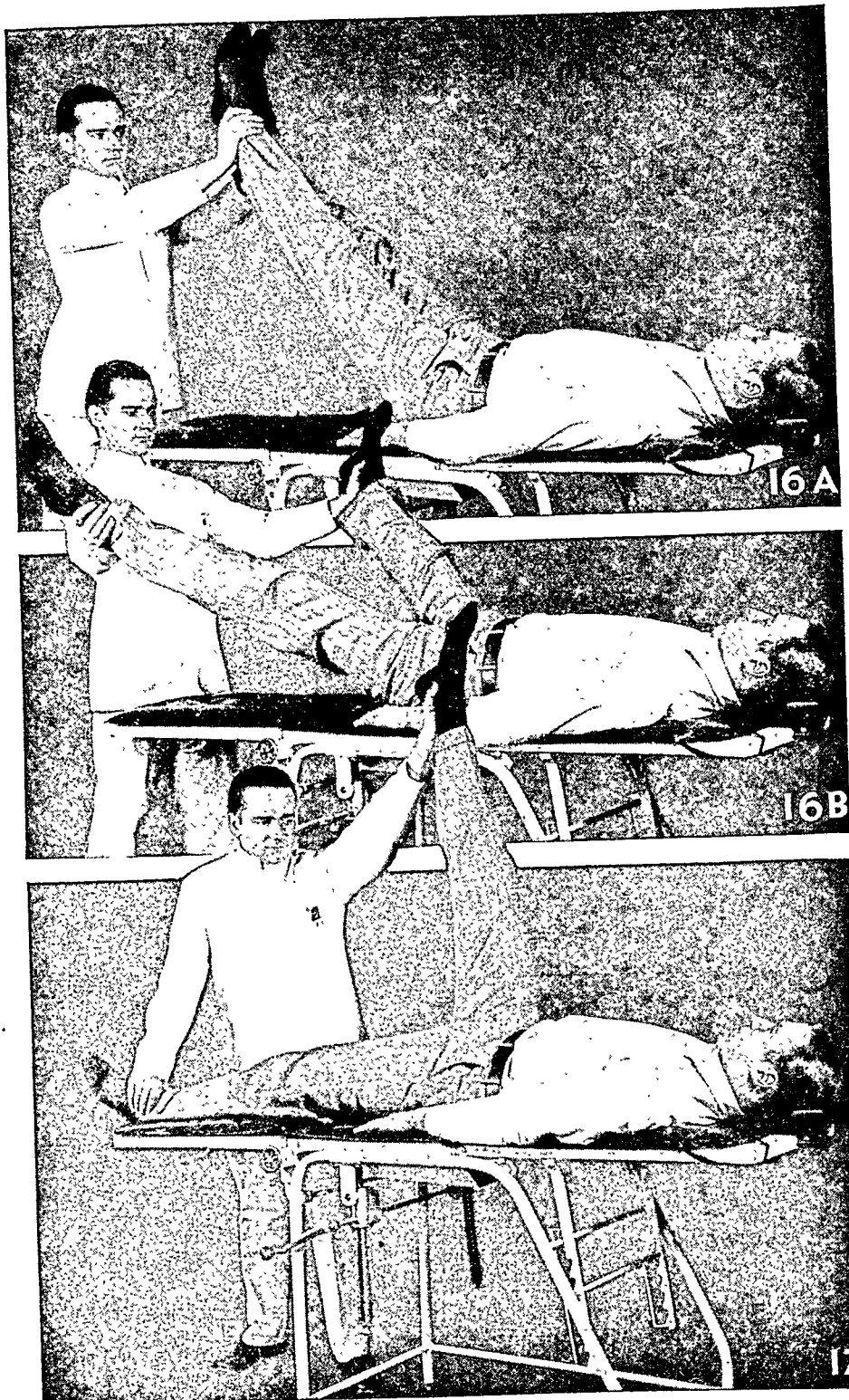
15A. For a resisting exercise of the upper leg muscles, the feet of the patient are placed close together and the knees raised to a right angle. The operator then resists the patient's attempt to spread the knees.

15B. Here the movement is reversed. The knees are spread apart and the operator's hands are placed inside the knees to resist the inward movement. Greater care is necessary in this movement to prevent strain than in the preceding one.

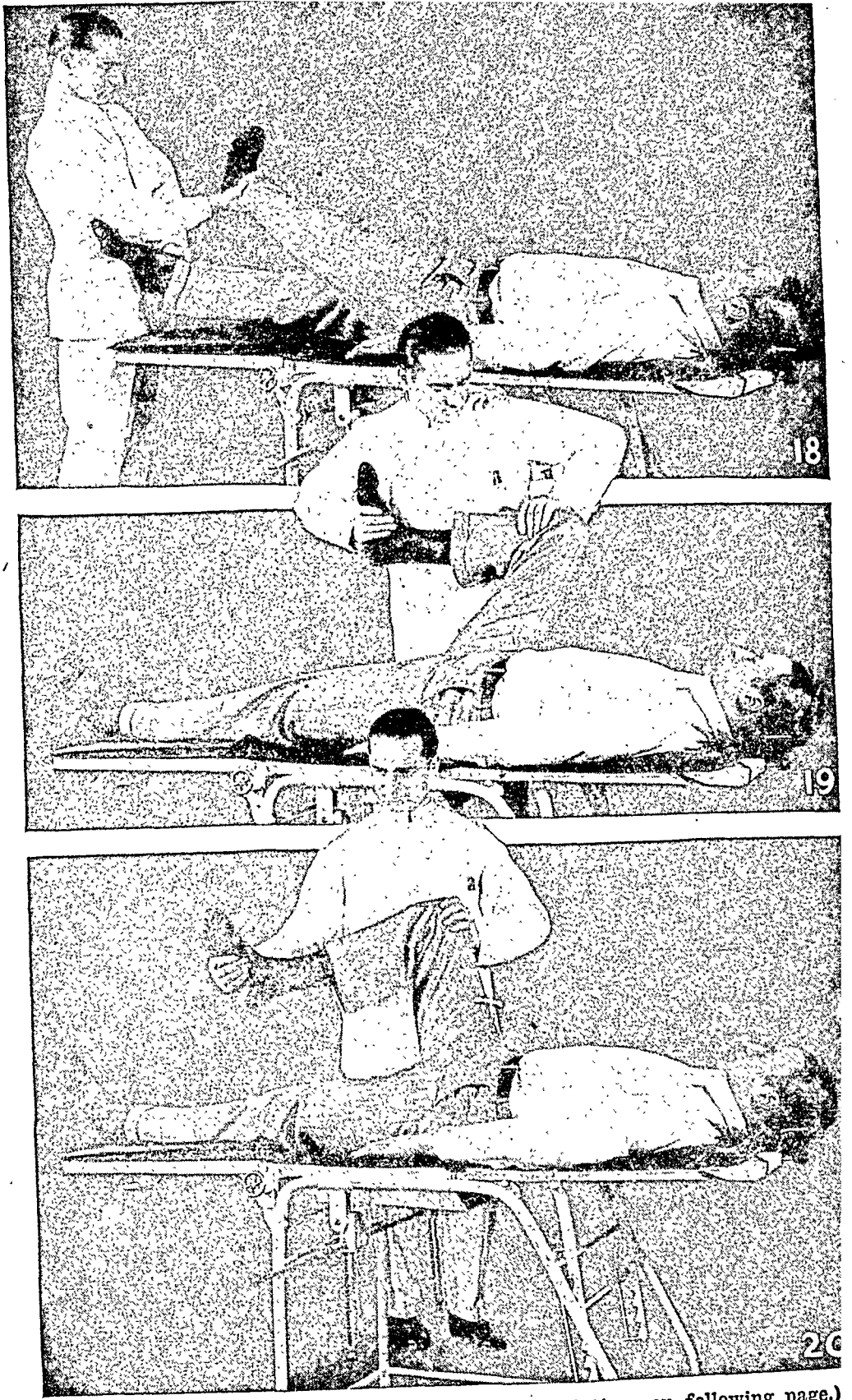
HIP AND SPINAL MOVEMENTS. (*See next page.*)

16A. This is a very effective movement for the hips and upper legs. The
16B. operator stands at the foot of the table and grasps both legs of the patient above the ankles, raising the legs to an angle of nearly 45 degrees with the body. The operator spreads the legs as far as possible, then returns them to their original position.

17. The operator stands at the foot of the table, while he holds one leg of the patient down with one hand and forces the other leg to a position at right angles to the body with his other hand, holding the leg rigid. Apply the same movement to the other leg.



HIP AND SPINAL MOVEMENTS. (See descriptions on preceding page.)



HIP AND SPINAL MOVEMENTS. (See descriptions on following page.)

HIP AND SPINAL MOVEMENTS.

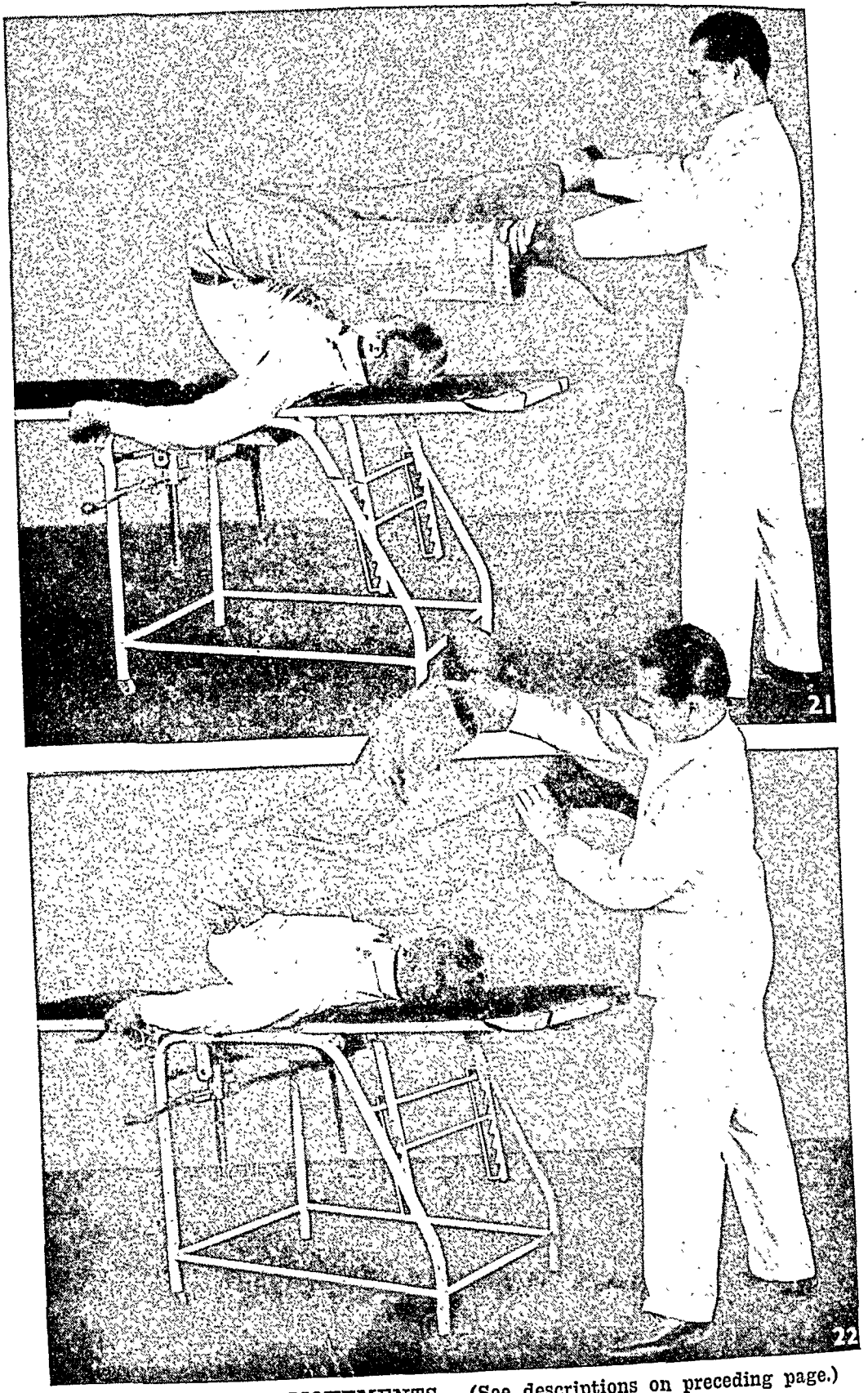
18. This illustration shows an excellent alternating movement for the legs. The operator, assuming the same position as in the illustration, crosses the patient's legs, first the left over the right and then the right over the left.

19. Flexing the thigh on the abdomen is a very important movement for the legs. The operator, standing at the side of the patient, grasps the knee with the left hand and the instep with the right hand, raising the leg and pressing down on the knee and flexing the thigh as tightly as possible on the abdomen. Release the pressure carefully, then repeat. Apply the same movement to the other leg.

20. A movement for the knee-joints, ligaments and other tissues is shown here. The leg is first placed in the flexed position, the left hand on the knee, the right hand grasping the smaller part of the instep. The leg is then twisted first to the right and then to the left. This movement should be performed with much care.

21. This is a rather strenuous movement that must be regulated according to the spinal flexibility of the patient. It should not be executed in cases of high blood pressure or heart disease. The patient lies on his back and grasps the side of the table firmly, keeping the knees rigid. The operator draws the feet and legs over the head and presses downward, being careful not to go so far as to hurt the patient's back. This movement is an excellent spinal exercise. (*See next page.*)

22. With the same positions as described in 21, the operator draws the feet back over the patient's head and twists the left leg underneath the right, the right being slightly raised; he then twists the whole body to the right. The same movement, reversed, should be applied to the left leg. (*See next page*)



HIP AND SPINAL MOVEMENTS. (See descriptions on preceding page.)

It is well when planning to give treatments to perform movements on oneself, to know just how each movement affects the patient. This will enable one to perfect his own technique considerably; for, when giving a movement, he will remember how it felt to him, and will therefore try to give it in the most perfect and satisfactory manner. While a treatment will do good even when given by one not so expert, no one should be satisfied with doing less than his best.

In giving these treatments, a suitable table is a great help. Treatment may be given on almost any kind of a table, or on a bed or couch, but the operator can always work more effectively if he has a table of the proper height and width. The patient will also be more comfortable and will relax better. The table should be long and wide enough to hold the patient without any parts of his body projecting beyond its edges; but it should not be any wider than is necessary, because, in some of the movements, the patient straddles the table, and too wide a spread of the legs will be uncomfortable. The table should be well padded, but not so soft that the patient sinks into it.

Suitable Table Important

For the operator's sake the table should be about as high as his hips, as most of the movements can then be administered without much bending or stretching. An adjustable table is convenient, but not necessary. If the operator wishes to get well above the patient, he can stand on a box or stool. Both operator and patient, especially the latter, should be loosely and comfortably dressed. Whenever possible, it is well for the patient to be stripped, so as to permit the greatest freedom of motion, and so that the direct spinal manipulation may be applied to the bare skin. If something must be worn, a one-piece bathing-suit will do very well. Treatment can be given to a patient wearing a gymnasium costume, or stripped to the waist, or when fully clothed if necessary, but unless the feet are not to be treated, the shoes should always be removed. Doctors applying these corrective movements to female patients usually have them wear pajamas or a kimono which opens down the back. When exercise as well as manipulation is to be given, a minimum of clothing is essential. In this case, also, it is particularly important that there be plenty of fresh air in the room. *(Continued on page 2619.)*







BACK AND SHOULDER MOVEMENTS. (See descriptions on following page.)

BACK AND SHOULDER MOVEMENTS.

The movements described below are illustrated on the preceding and following pages. The photographs are numbered to correspond with the figure opposite each paragraph below.

1. A very effective treatment for the spinal muscles, ligaments and nerves is a deep compression applied to the spine. The first two fingers of the right hand are placed successively one on each side of each spinal process. The left hand pressing down upon the right hand with a series of short compressing movements travels with the right hand down the entire length of the spine. Press gently, but firmly, between each two spinal processes until all the vertebræ have been treated.

2. Another movement that is particularly helpful in the stimulation of all the vital spinal tissues is vibrating friction applied to the spine with the tips of the fingers. Considerable compression may be exerted.

3. An effective method of improving the circulation is the deep massage of the entire back with outstretched fingers, combined with vibratory movement.

4. Instead of using the fingertips, as in 3, here the full hand pressure is used on the spine. One hand is placed upon the other, and pressure is applied successively to the spinal processes all the way down. (*See next page.*)

5. An even more vigorous movement is shown in illustration 5, that of percussion of the spine by striking with the clenched right fist upon the back of the left hand, which is passed over all the spinal processes successively, and also over the transverse processes of the vertebræ. The percussion should not be hard enough to cause pain. (*See next page.*)

6. For stretching and exercising all the muscles of the back, the twisting movement applied to the spinal soft tissues is excellent. One hand of the operator is placed flat upon the patient's back and the other hand is placed on top of that hand. The operator then twists from left to right and right to left. (*See next page.*)







BACK AND SHOULDER MOVEMENTS. (See descriptions on preceding page.)







BACK AND SHOULDER MOVEMENTS. (See descriptions on following page.)

BACK AND SHOULDER MOVEMENTS (*Continued*).

7. A rolling friction movement, applied with considerable pressure with the hands spread out, may be used, as shown, to treat the entire back. (*See preceding page for photograph.*)

8. This illustration shows a kneading movement of the small of the back between the twelfth rib and the pelvic bone, going across the back from one side to the other. It should be done without interference of clothing. (*See preceding page for photograph.*)

9. This illustrates the shaking movement as applied specifically to the spine. The operator grasps the spinal processes between the thumbs and fingers and vibrates sideways with a shaking movement, starting at the neck and going down to the end of the spine. (*See preceding page for photograph.*)

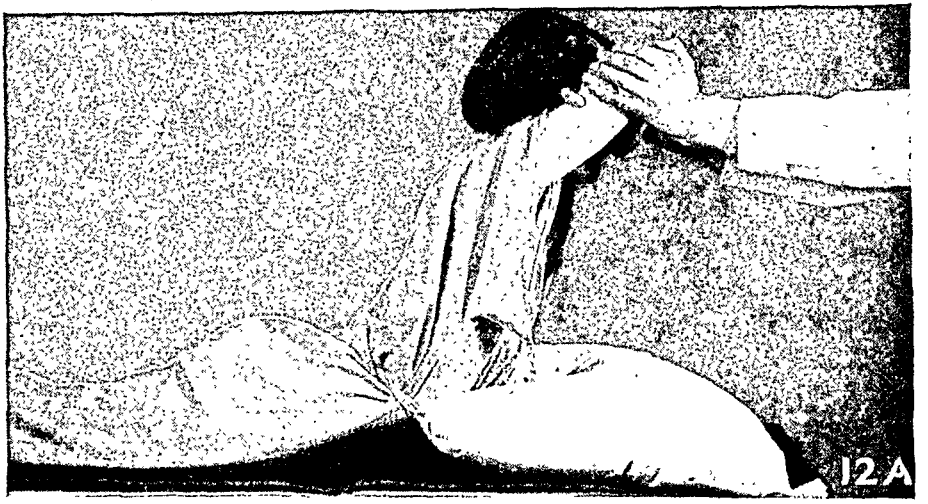
10. Another treatment for the entire spine, and one which may also be applied as a vibratory movement, consists of pressure exerted sideways on the spinal processes, pulling with the fingers of one hand and pressing with the thumb of the other. (*See next page.*)

11. For a general kneading and vibratory movement of all the muscles of the back, the operator uses the finger-tips, with considerable pressure, as shown in this illustration. It is applied with a rolling movement. (*See next page.*)

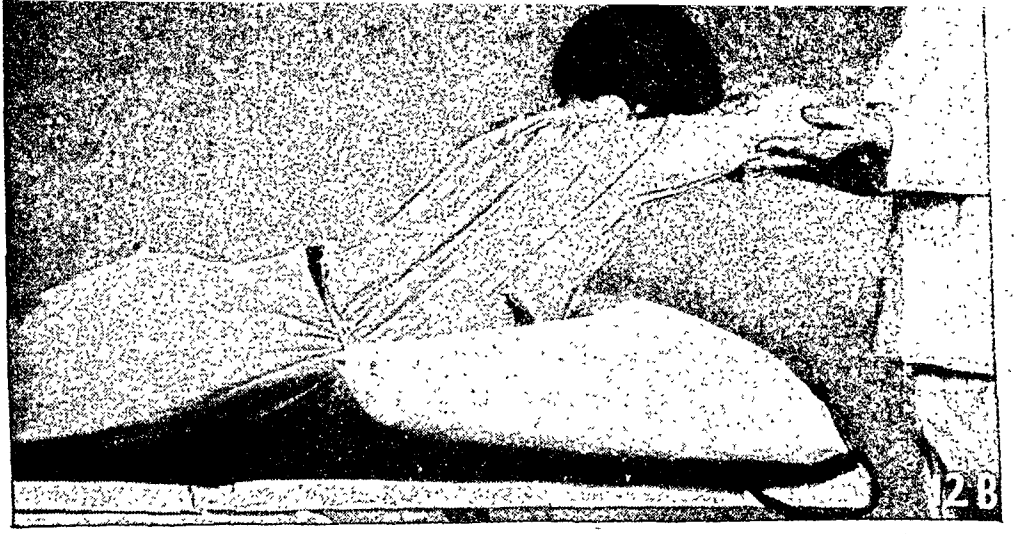
12A. This illustrates the position involved in an excellent movement for treating the dorsal region of the spine and the chest. The patient lies face down with the shoulders extending over the end of the table, resting the forehead on forearms. The operator then grasps the patient by the elbows and raises the upper body as high as possible, the patient fully relaxing. (*See next page.*)

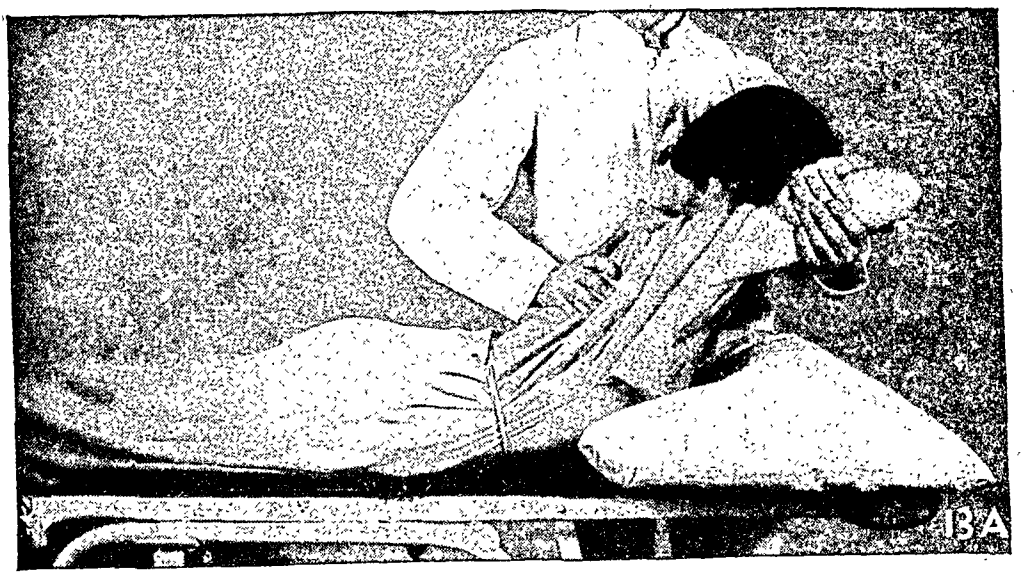






BACK AND SHOULDER MOVEMENTS. (See descriptions on preceding page.)







BACK AND SHOULDER MOVEMENTS. (See descriptions on following page.)

BACK AND SHOULDER MOVEMENTS (*Continued*).

12B. With the upper body raised as shown in 12A the patient is moved to the left and then to the right, also the shoulders and trunk rotated left and right.

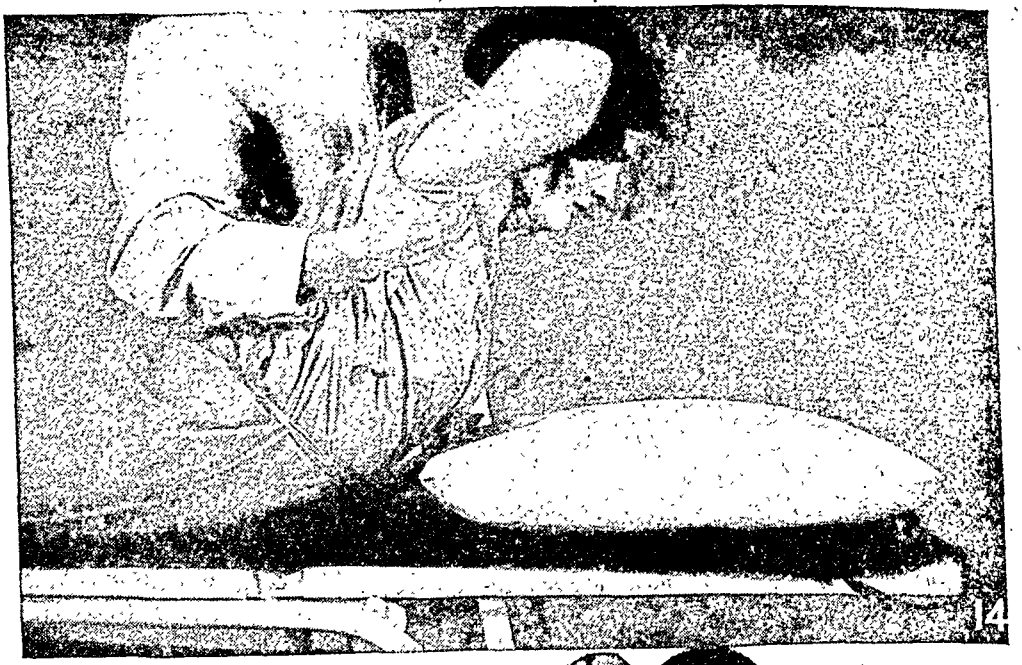
13A. This illustrates further movements for the dorsal region of the spine, with the patient assuming the same position as shown in 12A. Here the operator stands at the side of the patient, rests the folded arms upon his left forearm, carefully raises the patient as high as possible, and with the right hand kneads and presses on the muscles of the spine and entire back. As in all these treatments for the spine, care must be observed in cases of hernia, recent abdominal operations, abdominal adhesions, or of prolapse of abdominal organs.

13B. Continuing the previous movement, the operator pulls the patient as far to the left and then as far to the right as possible, while kneading and pressing with the right hand.

14. Here the patient interlaces the hands at the back of the neck, keeping the elbows out straight. The operator, standing at the side, grasps the patient's arms and raises the upper body as high as possible. (*See next page.*)

15. A twisting movement may be executed with the patient in the same position as above. The operator grasps the patient by the left arm and twists the body as far to the right as possible, meanwhile pressing the spine and muscles of the back with the right hand. (*See next page.*)

16. With the patient assuming the same position, the operator grasps the near arm and elevates the shoulders and elbow, the other hand kneading the muscles of the side and back. (*See next page.*)







BACK AND SHOULDER MOVEMENTS. (See descriptions on preceding page.)





BACK AND SHOULDER MOVEMENTS. (See descriptions on following page.)

BACK AND SHOULDER MOVEMENTS (*Continued*).

17. Here the patient is still lying prone upon the table, but now the left hand is placed back of the neck. The operator passes his left hand through the loop of the left arm of the patient, then presses between the shoulders with both hands as shown, applying vibration to the spine. (*See preceding page for photograph.*)

18. An excellent movement for stretching the abdominal muscles and tissues is shown in this illustration. The patient first sits close to the end of the table, with legs strapped to the other end. The operator bends the upper part of the patient's body backward and forward and then rotates it. While the patient's head is almost touching the floor, the operator presses downward on the shoulders, keeping the elbows of the patient straight. Absolutely to be avoided in all cases of weak abdomens, ruptures, prolapses, and previous abdominal or pelvic operations. (*See preceding page for photograph.*)

19. Again with the patient sitting at the end of the table, the upper body is lowered and allowed to rest in a relaxed position with the small of the back on the hand of the operator. A few gentle upward jerks spring the spine and afford a very effective stimulative movement. See 18 for contraindications. (*See next page.*)

20. This is another movement for the spine. With the patient lying face downward, shoulders extending over the end of the table, and feet strapped down, the operator grasps the elbows and twists the upper body first to the right and then to the left as far as possible. (*See next page.*)

21. Here the patient is in a sitting position, with feet strapped down, as above. The operator passes his arms under the patient's arms and places his hands over the back of the patient's neck. With this hold he starts a rotating and twisting movement, first to the left, then downward, backward, and to the right. (*See next page.*)



BACK AND SHOULDER MOVEMENTS. (See descriptions on preceding page.)







BACK AND SHOULDER MOVEMENTS. (See descriptions on following page.)

BACK AND SHOULDER MOVEMENTS (*Continued*).

22. This shows a useful shoulder movement. The patient sits upright on the table; the operator, standing behind, passes his arms under the patient's arms and grasps the inside of the shoulders, the patient's arms extending and resting on the elbows of the operator; the shoulders of the patient are pulled backward as far as possible, and then the arms rotated. In the meanwhile the operator presses on the front of the shoulders.

23. This shows a twisting movement of the shoulder and upper arm. The operator grasps the patient's hand, holding the forearm at right angles to the shoulder and grasping the elbow with the right hand. Being very careful that this movement is not overdone, he twists the arm forward and backward as far as possible.

24. For a resisting movement for the arm, the operator grasps the left hand of the patient with his right hand, and the patient's arm above and beneath the elbow with the left hand. The patient then flexes the arm as tightly as possible, the operator resisting the movement.

25. The operator stands behind the patient, grasping both shoulders firmly. When the patient turns the head to the right the right shoulder is pressed forward as far as possible, while the left shoulder is pulled back. The patient then turns the head to the left and the left shoulder is pressed forward in the same way. (*See next page.*)

26. This procedure given with care, is an effective movement for the cervical spine. The patient sits on the table and the operator stands back of her. The operator, after taking the "full Nelson," as shown in the illustration, lifts up, which forces the patient's chin down against the chest. (*See next page.*)

27. Illustrating a shoulder movement, the operator grasps the patient on the front part of the left shoulder with his right hand, and, with the other hand pressing from the back on the scapula, forces the shoulder back and the scapula forward. This movement is very effective in straightening out round shoulders. (*See next page.*)



BACK AND SHOULDER MOVEMENTS. (See descriptions on preceding page.)



BACK AND SHOULDER MOVEMENTS. (See descriptions on following page.)

BACK, SHOULDER AND ARM MOVEMENTS (*Continued*).

28. This is a simple arm-stretching movement. The operator places one hand on the patient's shoulder and, firmly grasping the patient's hand with the other, pulls the arm outward. (*See preceding page for photograph.*)

29. An effective twisting movement consists simply of grasping the forearm with one hand and the finger-tips with the other and twisting as far as possible without causing discomfort. (*See preceding page for photograph.*)

30. Another arm-stretching movement is shown here. With the patient sitting on table, the hands clasped back of the neck, the operator grasps the elbows and pulls them back as far as possible without causing discomfort. (*See preceding page for photograph.*)

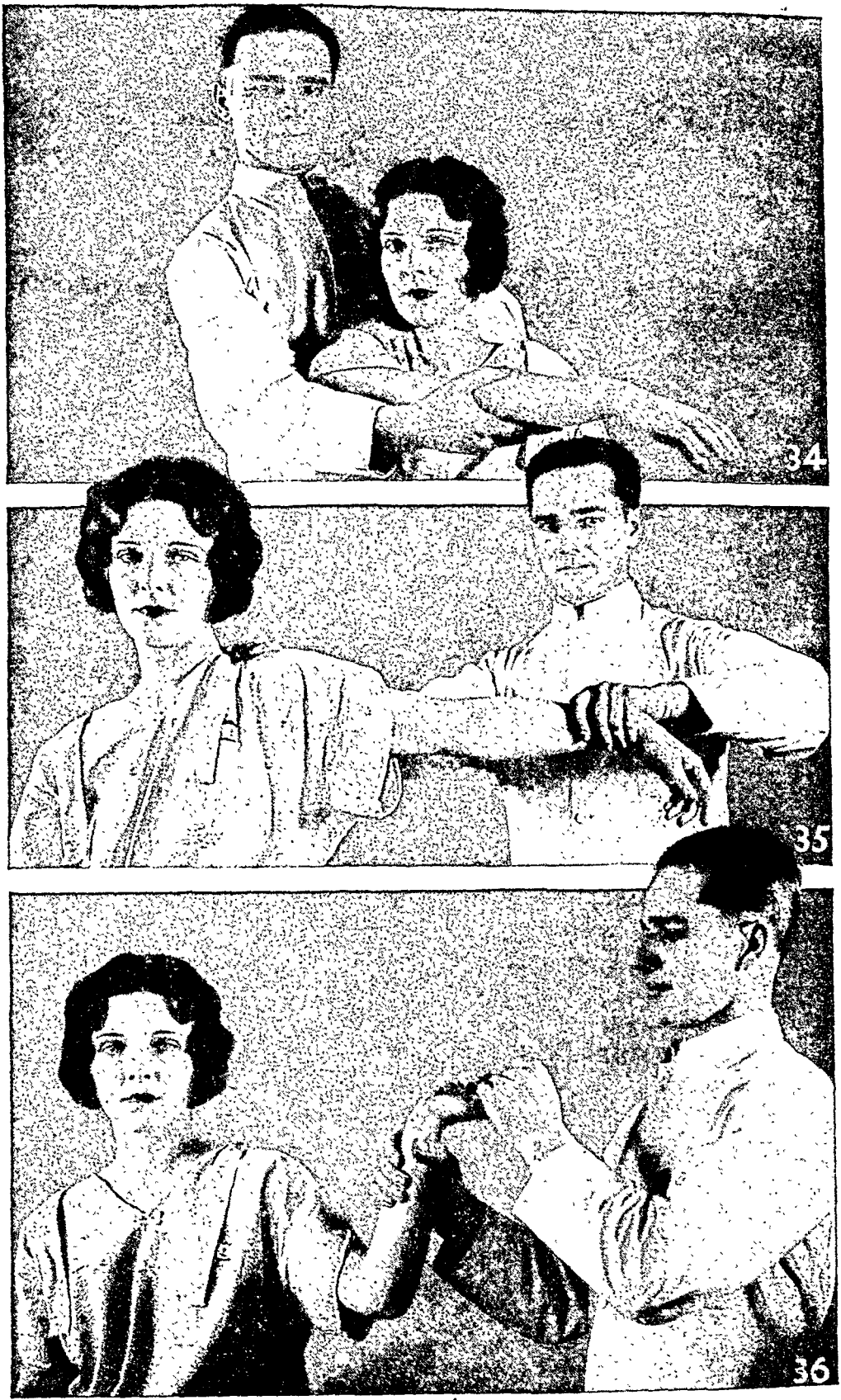
31. With the patient sitting in a relaxed position on a table, the operator raises and lowers the shoulders on each side. (*See next page.*)

32. Operator stands behind the patient, who sits with the hands clasped behind the head. The operator puts his left arm under the left arm of the patient, resting his palm on the back of her hand. He puts his right hand on the right pelvic bone of the patient and then draws his left hand backward while keeping the patient's right hip rigid. He repeats the movement by reversing his hands for the other side of the body. (*See next page.*)

33. Here the operator, standing behind, grasps the left shoulder with the right hand in front, extending the right arm around the patient's neck, and with the left hand grasps the forepart of the arm, which is rotated, raised, pressed forward, downward, and drawn backward in rotation. (*See next page.*)



BACK AND SHOULDER MOVEMENTS. (See descriptions on preceding page.)



BACK AND SHOULDER MOVEMENTS. (See descriptions on following page.)

BACK, SHOULDER AND ARM MOVEMENTS (*Continued*).

34. In this movement the operator stands at the side of the patient and grasps the right arm at the elbow with his right hand, with the left hand on the right shoulder. He then presses the arm as far as possible forward and rotates across the body in front, meanwhile holding back the shoulder with the left hand.

35. In this arm movement, the operator grasps the left shoulder of the patient with his right hand, the wrist with the left hand, and pulls back the arm as far as possible, holding the shoulder forward in position with the right hand.

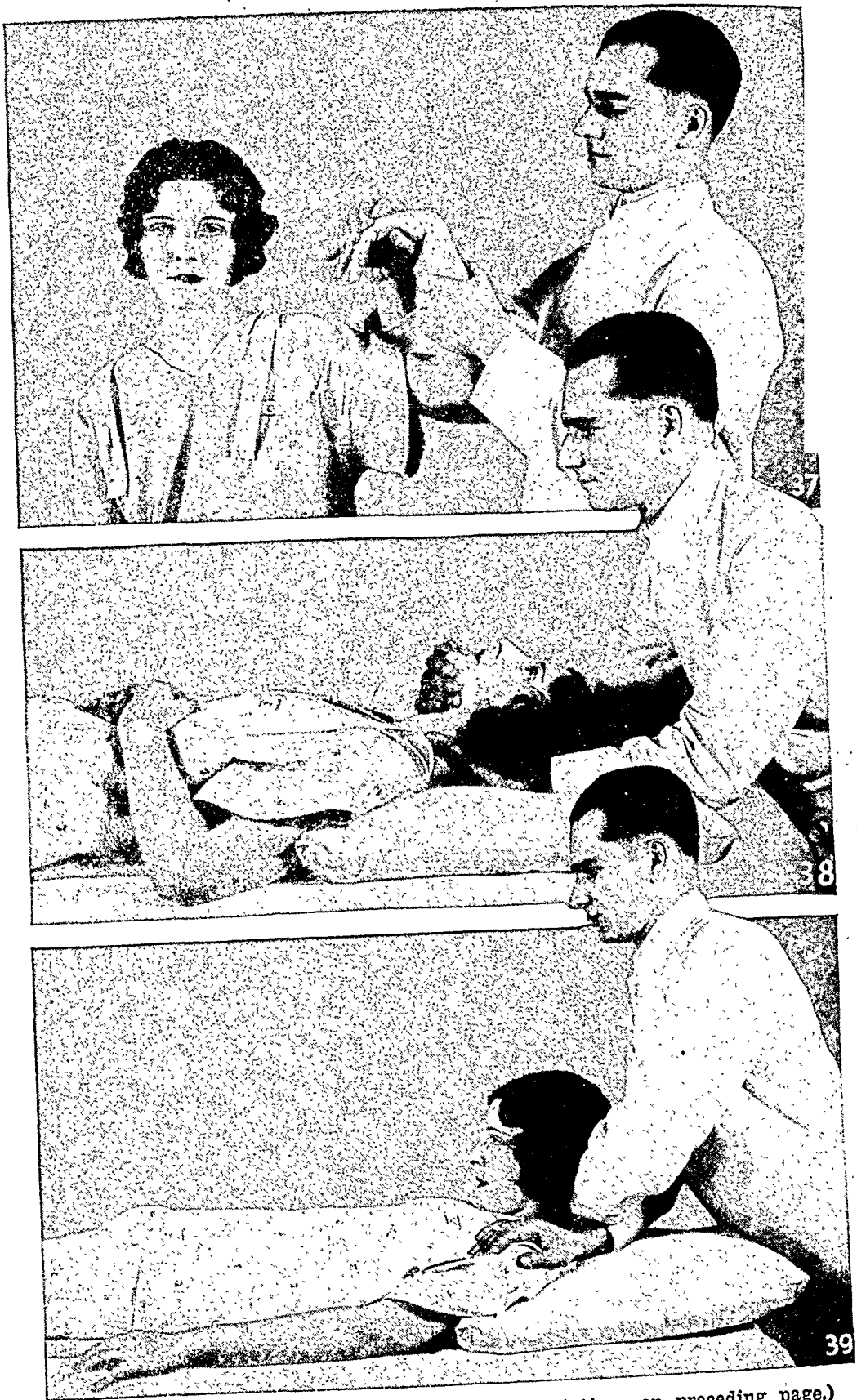
36. This is a resistance exercise for the wrist. The operator takes hold of the patient's wrist with his right hand and the finger-tips with his left hand. The patient then tries to move the wrist in every direction, the operator resisting lightly at first.

37. This movement is similar to the preceding one, except that the hand is bent to position shown to start with, then raised or straightened against the moderate resistance of the operator. (*See next page.*)

ARM AND NECK MOVEMENTS. (*See next page.*)

38. This is a movement for stretching the neck and stimulating the cervical region of the spine. With the patient lying face upward, the operator grasps the chin with his right hand, placing the left hand at the back of the neck, then pulls backward, moving the head first to one side and then to the other, and finally rotating the head, stretching it at the same time.

39. Here the operator crosses his arms and grasps the patient's shoulders from beneath with both hands and raises the head as high as possible.



ARM AND NECK MOVEMENTS. (See descriptions on preceding page.)



BACK AND NECK MOVEMENTS. (See descriptions on following page.)

BACK AND NECK MOVEMENTS (*Continued*).

40. In this movement the operator places the right hand under the neck and on the front of the patient's left shoulder, his left hand on the side and back of the head. He then raises his right arm, holding the head firmly with the left, and pushes the head upward at an angle with the body, stretching the neck at an angle. This movement must be done with caution.

41. Patient sits straddling the table and clasps hands behind head. Operator stands behind the patient, passes his right arm through the loop of the patient's right arm, placing his right hand on the back of the patient's hands. The operator's left hand rests on the patient's left hip. After instructing the patient to relax completely, the operator bends the patient's body over toward the right and then twists toward the right, carrying the movement as far as possible. The patient is then returned to straight sitting position and the movement is repeated several times. The same movement is performed to the left by reversing the positions of the hands.

42. Starting position for this movement is the same as 41, except that the position of the hands is reversed, since the illustration shows the movement being performed to the left. In this movement, instead of bending the patient's body to the side and then twisting it, the body is drawn backward and turned to the side, meanwhile holding the hips firmly on the table with the free hand. This stretches the entire right side and twists the spine. The same movement can be performed to the other side by reversing the position of the hands.

In giving a general treatment it is customary to begin with the neck, moving thence to the hands, arms, shoulders, feet, legs, hips, and spine. This applies to the face-up, face-down, and sitting positions. In the last it is seldom that any parts other than the neck, spine, and shoulders are treated. If a movement is given in one position, it is not necessary to repeat it in another position, but it may be done if there is some special reason for doing so. One may start with the face-up reclining or the sitting positions, but as a rule it is well to finish with the face-down reclining position, in order that soothing and relaxing pressure may be applied to the spine as the finishing touch. Of course, if the treatment is intended primarily for stimulation, one may use any position for starting and finishing. There are no hard and fast rules in the order of treatment, the variety of movements, or the length of the treatment; these are all adapted to the individual's needs. It is always well, however, to avoid over-treatment. If in doubt, better give too little treatment than too much. If the patient feels very tired after a treatment, give less the next time. An exclusively manipulative treatment should not last more than twenty minutes, and fifteen is generally sufficient. The amount given during a stated time will vary, of course, with the speed of the operator, but in most cases time is a fairly safe guide. If exercise is to be included with the manipulation, the latter should be shortened to ten minutes. The amount of exercise is governed strictly by the strength and reactive powers of the patient. A period of rest should follow such a treatment, and preferably it should also follow simple manipulation. In giving exercise, follow the general rules which apply to all exercise and which are given in another volume of this work.

Order of General Treatment

Local treatment may be given instead of general treatment whenever it is desired specially to affect a certain part, as in cases of flatfoot, knock-knee, and spinal curvature. If general treatment is to be given, with special attention to a certain part, the manipulation of the latter should be left until the last, or an extra local treatment to this part may be given at a different time of the day. In the case of a weak patient, it is usually necessary to confine the treatment to the parts needing it most. *(Continued on page 2650.)*









SELF-APPLIED WRIST MANIPULATIONS. (Descriptions on following page.)

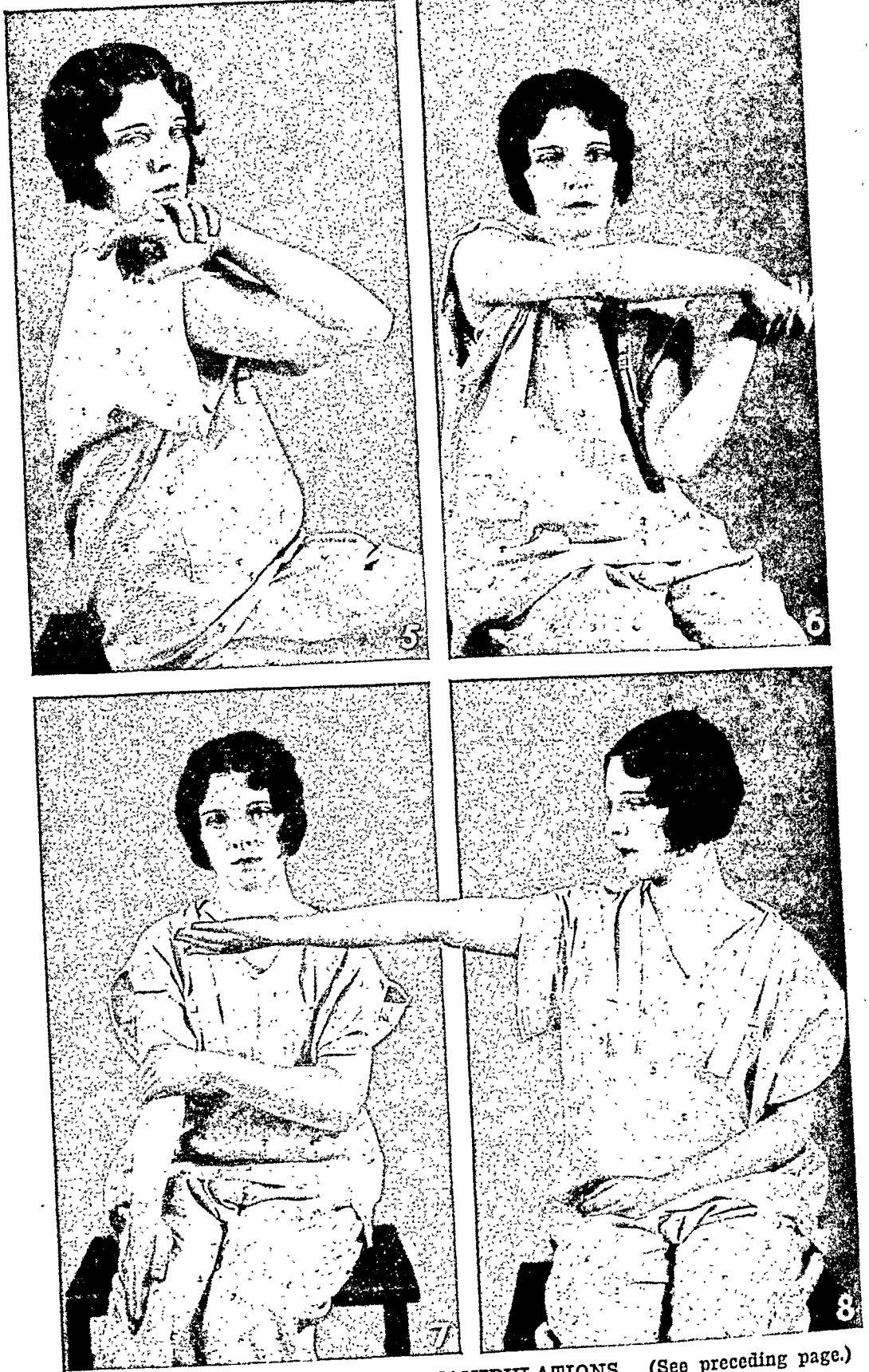
SELF-APPLIED WRIST MANIPULATIONS.

1. In this exercise for the proper formation of the lower arm and wrist, the palm and fingers of one hand are placed on top of the other. They are pressed tightly against one another on the left side, as illustrated, and then brought gradually around to the right side, still pressing tightly against each other.
2. Bending the wrist to the side consists simply of grasping the left hand with the right, as shown, and bending the wrist several times far to one side and then far to the other, stretching the relaxed tissues as much as possible without pain. Repeat the movement, with the left hand resisting. Apply the same treatment with the hand positions reversed.
3. This movement is for the wrist, but it also affects the tissues of the forearm. Grasp the left hand, as shown, with the right, and twist several times as far as possible to the right, then to the left, relaxing the left hand. Then repeat the movement with the left hand resisting. Apply the same treatment with the hand positions reversed.
4. For stretching the tissues on the back part of the wrist and forearm, allow the relaxed hand to fall as indicated, then press back as far as possible several times with the right hand. Apply the same treatment to the other hand.

SELF-APPLIED ELBOW-JOINT MANIPULATIONS.

(*See next page.*)

5. For limbering the elbow-joint and stretching the adjacent tissues. Grasp the right hand with the left and flex or bend the forearm as far as possible several times, with muscles completely relaxed. While the arm is in the position shown, move the right wrist far over several times to the right and to the left. Apply this treatment to the other arm.
6. This is another variety of the movement for the elbow-joint. Bend the left arm until the forearm is in an almost perpendicular position, then push the left arm several times with the right hand far over to the left, as shown, and then bring it far over to the right. Apply the same to the other arm.
7. With the left hand grasp right forearm firmly around the elbow, as illustrated. Now pull inward as far as possible several times. Left arm is then given similar treatment.
8. Extending the arm straight out from the shoulder, twist the wrist and the arm in one direction and then the other, repeating several times and always attempting to twist still farther after the movement has apparently reached its limit.



SELF-APPLIED ELBOW-JOINT MANIPULATIONS. (See preceding page.)

SELF-APPLIED SHOULDER MANIPULATIONS

9. Place a broom handle across the doorway by catching it as illustrated in 9; then swing the body backward as far as possible, thus bringing the shoulders forward. Brace the feet well.

10. Catch the sides of the door as illustrated and swing the body forward from the feet. This is an excellent movement for expanding the chest, and for strengthening the shoulders.







SELF-APPLIED NECK MANIPULATIONS

11. Place the left hand on the base of the skull and the right under the chin. Now thrust the chin to the right, resisting with the right hand. The left hand is mainly to steady the head, but may give considerable pressure also. Reverse hand positions and repeat to the opposite side. Do the same resisting with the hands.









SELF-APPLIED NECK AND WAIST MANIPULATIONS. (See descriptions on following page.)

SELF-APPLIED NECK AND WAIST MANIPULATIONS.

12. Hold the head with the left hand, as illustrated; put the right hand on the opposite knee. Pull the head towards the left, while at the same time stretching the right shoulder downward. This exercise is good for the thyroid gland and for the right side muscles of the neck and is a tonic stimulant to the whole body.

13. Intertwine the fingers at the back of the head and press the head forward on the chest as far as possible. Do the same resisting with the neck muscles. This movement is good for the larynx, pharynx and tonsils, and strengthens the muscles of the throat and back of the neck.

14. Intertwine the fingers on the forehead and press backwards. Do the same resisting with the neck muscles. This movement strengthens the throat muscles and tissues and will have a mildly favorable effect upon the thyroid.

SELF-APPLIED WAIST AND BACK MANIPULATIONS.

15. While seated in a chair flex the arms as shown in this illustration, with the elbows out. Twist the body far to the right and then far to the left, making an effort to carry the movement to the extreme limit. Continue until slightly fatigued, alternating from one side to the other.

16. Standing with the legs far apart and the hands clasped at the back of the neck, bend backward, then rotate shoulders right and left without strain. Relax and repeat several times. (*See next page.*)

17. In a standing position, keeping the knees rigid, bend well forward, and then rotate shoulders right and left. (*See next page.*)

18. Lie on the back. Now swing the feet high in the air and back over the head, supporting the back with the hands, as illustrated. This exercise may have to be attempted several times before it can be performed as in the picture. It is one of the best spinal and abdominal exercises and helps to increase the height. (*See next page.*)







SELF-APPLIED WAIST AND BACK MANIPULATIONS. (See descriptions on preceding page.)









SELF-APPLIED WAIST, BACK, FOOT AND ANKLE MANIPULATIONS.
(See descriptions on following page.)

SELF-APPLIED WAIST AND BACK MANIPULATIONS.

19. Catch hold of a heavy chair, or an ordinary chair braced under a bed. Now swing the body forward on the toes, pulling the head back as far as possible, supporting the body balance with the hands. This is an excellent exercise for the waist, chest and small of the back, and to help correct or prevent round or drooping shoulders.

20. Grasp the ankles with both hands, keeping the knees rigid. Now bend the arms and pull the body farther downward.

SELF-APPLIED WAIST, BACK, FOOT AND ANKLE MANIPULATIONS.

21. This illustrates an exercise that will relieve and prevent callouses and painful affections of the ball of the foot. The patient grasps and presses the foot, as illustrated.

22. In the same starting position as above, press downward on the knee of the left leg with the left hand as shown, and pull the toes upward with the right hand, trying to carry the movement to the extreme limit, and repeating several times.

SELF-APPLIED FOOT, ANKLE AND KNEE MANIPULATIONS.

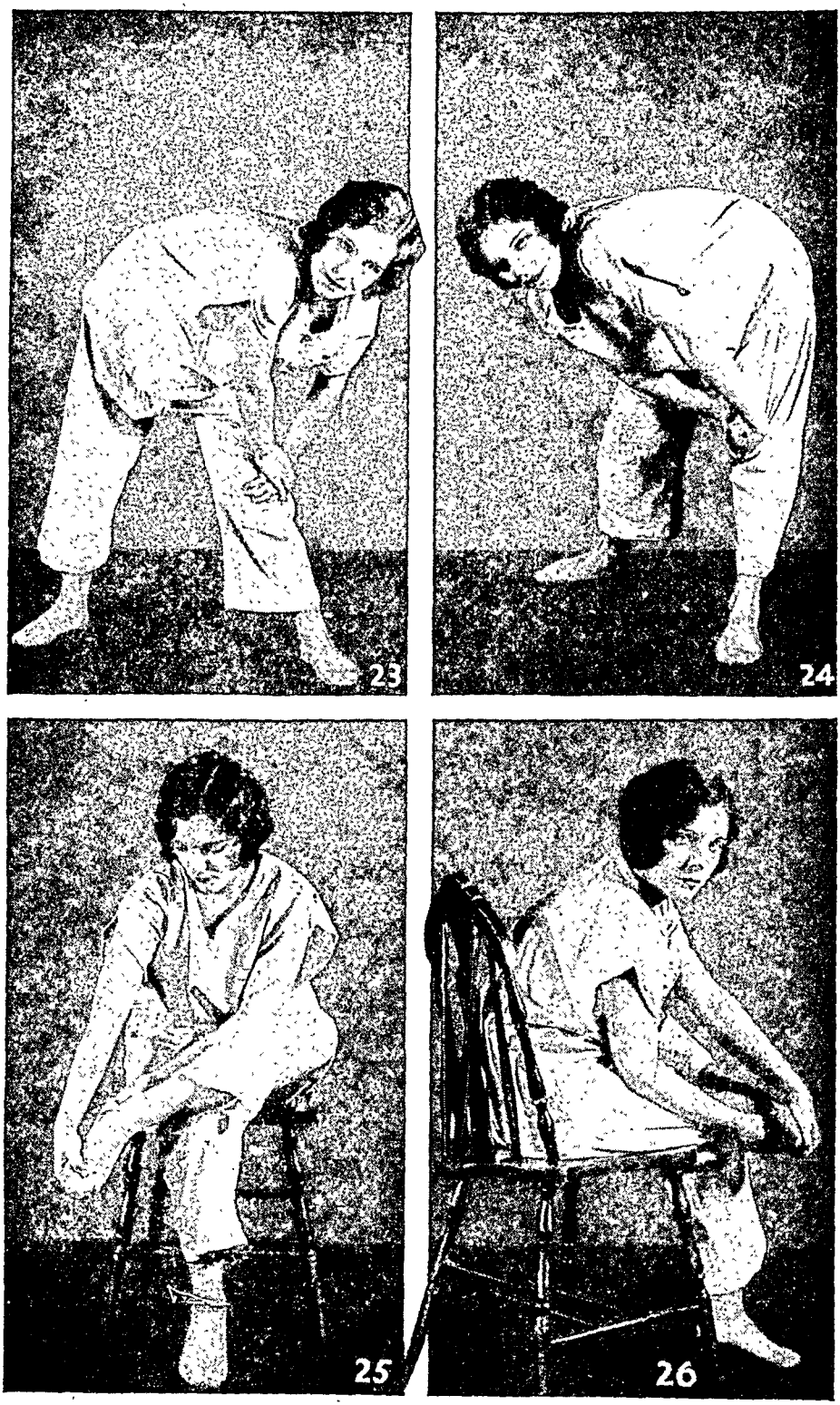
(*See next page.*)

23. An excellent movement for correcting bow-legs, when the defect is mostly caused by abnormal articulation of the knee-joint, is shown here. Leaning forward, with one foot extended, press inward several times with both hands on the knee. This exercise also stimulates the tissues in and about the joint.

24. A similar movement is used for adding suppleness and strength to the knee-joint, and for assisting in remedying knock-knees. Standing with the feet far apart, reach down and place the hands on inner side of the knee. Press outward several times upon the knee. Repeat this several times, and then apply the treatment to the other knee.

25. Resume sitting position and cross the left leg over the right knee. Pull downward on the toes with the right hand and push upward on the heel with the left hand, carrying the movement as far as possible. Relax and repeat several times. Same movement for the other foot, reversing the positions of the legs and hands.

26. Starting position same as 25. Place the heel of the right hand beneath the longitudinal arch in the center of the foot and grasp the toes with the left hand. Push upward against the arch with the right hand, while pressing downward on the toes with the left hand, so as to force the bones of the arch toward a higher position. Relax and repeat several times. Perform the same movement on the other foot by reversing the positions of the hands and legs.



SELF-APPLIED FOOT, ANKLE AND KNEE MANIPULATIONS. (See descriptions on preceding page.)









SELF-APPLIED HIP AND SPINAL MANIPULATIONS. (See descriptions on following page.)

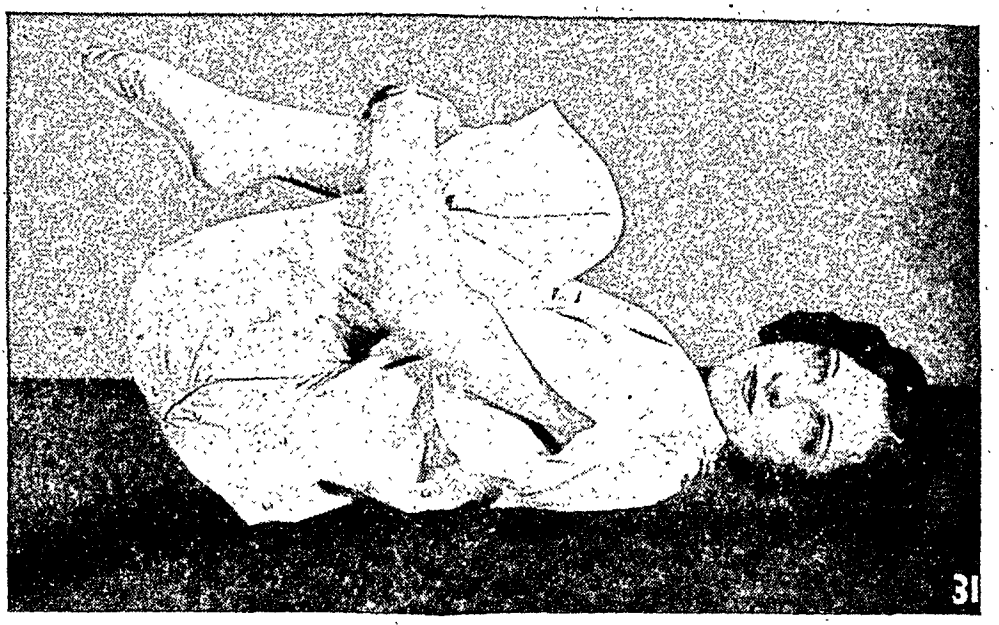
SELF-APPLIED HIP AND SPINAL MANIPULATIONS

27. Assume the reclining position on the back. Raise both legs and grasp the toes with the hands; then, while holding the legs straight, pull downward on the toes as far as possible, without causing undue pain. Relax and repeat several times. This stretches the backs of the legs and the lower spine.

28. Patient lies on the floor face down and grasps the right upper arm with the left hand, then raises the head as far as possible, trying to lift the right side up and back to the left. The movement is repeated on the other side of the body by grasping the left arm with the right hand.

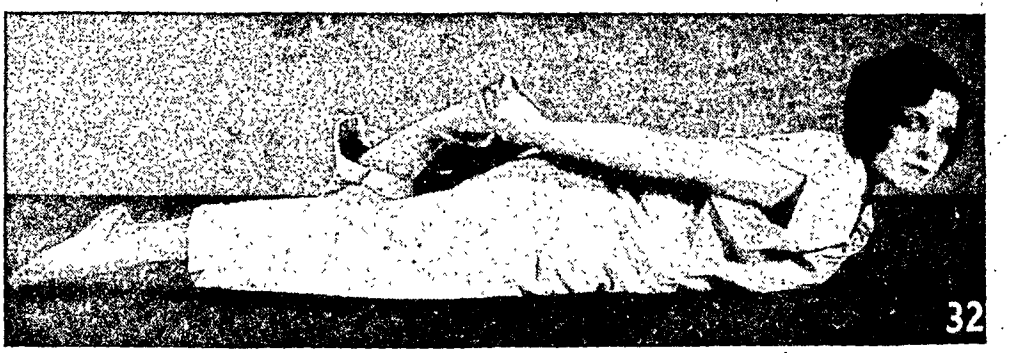
29. Lying prone on the floor, the head is raised high, the knees are bent, bringing the toes upward and forward. The arms are swung back, the fingers catching the toes. When this is accomplished, a rocking-chair movement may be attempted.

30. Lying on the back, raise the leg until it is in a perpendicular position. While holding the leg in this position, twist the leg and foot as far as possible, first in one direction and then in the opposite, in each case making an effort to exceed the previous limit.



SELF-APPLIED HIP AND SPINAL MANIPULATIONS

31. Lie on the floor and bend the knees on the chest, grasping them by interlacing the fingers over them. Then bring the body forward to sitting position and back again, also from side to side if desired.



SELF-APPLIED HIP AND SPINAL MANIPULATIONS

32. As shown in this illustration, following the movement previously described, catch the toe of the left foot with the left hand or both hands and pull upward vigorously, thus accomplishing the extreme flexion of the knee joint. Repeat this movement several times, and apply the same treatment to the other knee.

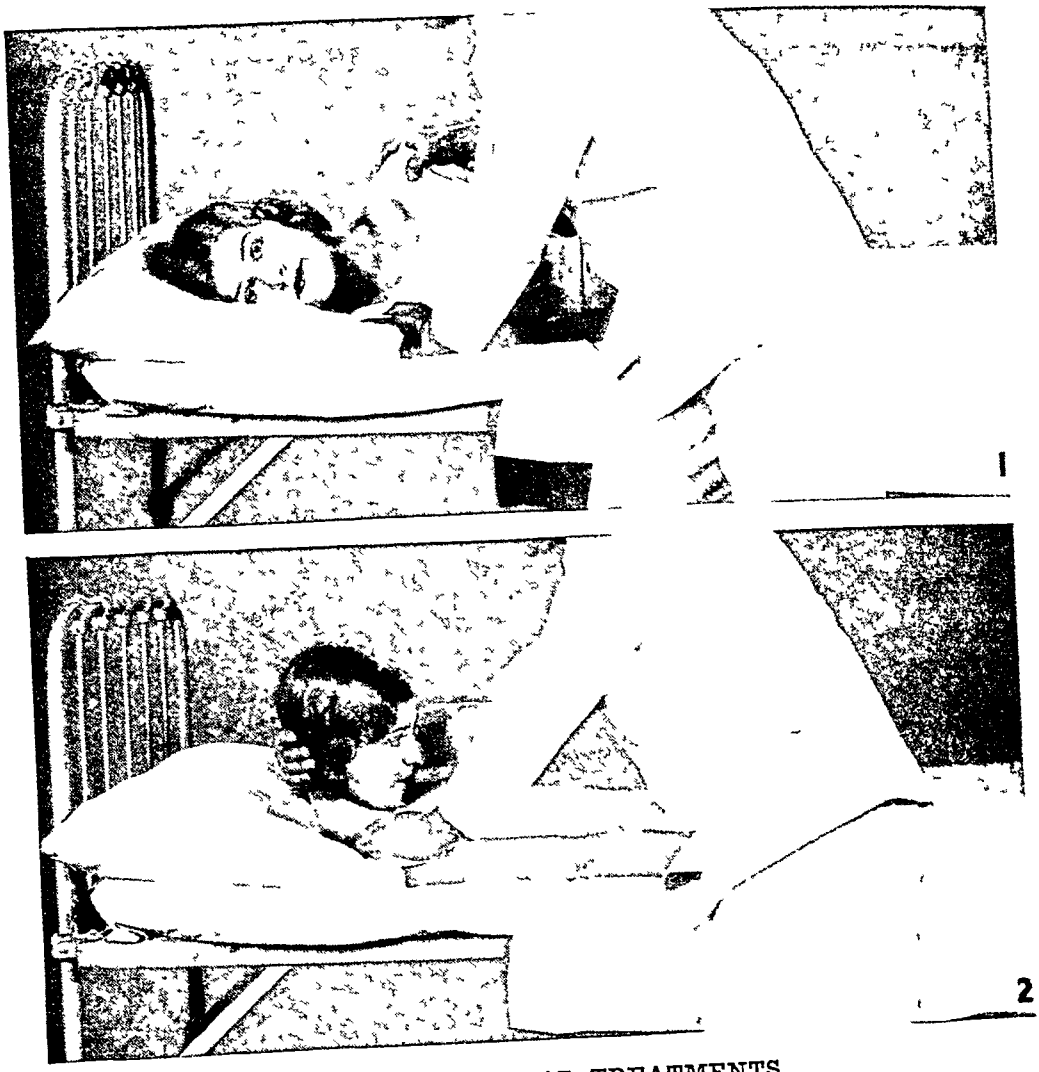




SELF-APPLIED LEG AND HIP MANIPULATIONS

33. Another movement for the knee is accomplished while seated in a chair. Raise the left foot from the floor and twist the toe inward as far as possible. With each successive movement, try to twist still farther, and then twist the foot outward as far as you can. Apply the same treatment to the other leg.

34. A movement that affects both the hip-joints and the knees is shown here In a standing position twist the right leg outward and as far around as possible, then inward as far as possible, going to the extreme limit in each movement. Apply the same treatment to the other leg.



SPECIAL MANUAL TREATMENTS

1. The patient lies on the bed (or treatment table) on the back. The operator stands to the patient's right, grasping both shoulders, and holds the right shoulder down with the left hand while raising the left shoulder forward with the right hand, thus twisting the body. This movement is done from 5 to 10 times. The operator now goes on the left side of the patient and the operation is repeated for the other side of the body. If the bed is not a narrow one the operator may remain on the one side.

2. With his left hand grasping the right shoulder of the patient and his right hand on the back of the patient's neck, the operator brings the head forward gently at first, more vigorously later on. This is done several times, if possible, making the chin touch the chest.



SPECIAL MANUAL TREATMENTS (Continued).

3. The operator grasps the patient's head, placing his palms over the ears, bringing the head forward, and then turns the head gently to the right and then to the left, repeating the movement several times each way.

4. The operator grasps the right shoulder of the patient, then places his right hand over the crown of her head and draws the head gently to as near the left shoulder as possible. The movement is repeated by changing the hands and the position of the head.

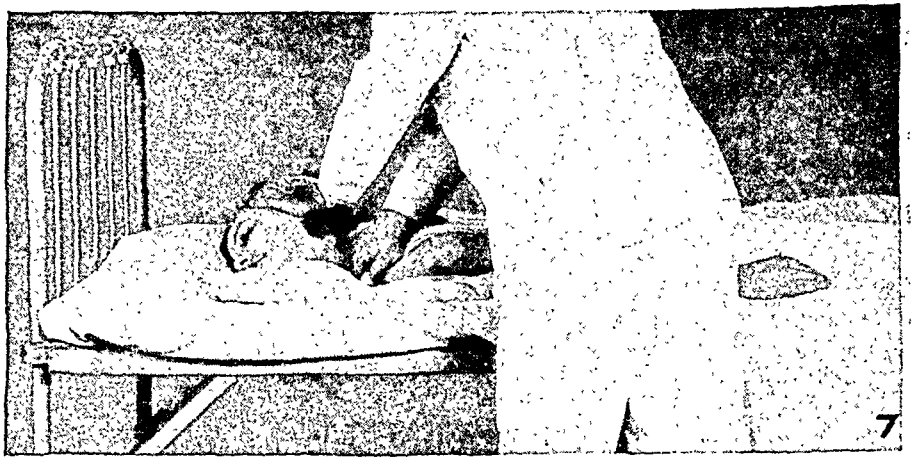




SPECIAL MANUAL TREATMENTS (Continued).

5. The patient lies prone. The head is raised, as in preceding movement, and then the head is gently turned to the left and to the right several times. *These movements must be done with care, especially 6, to avoid pain or discomfort or possible harm.*

6. The patient lies prone. The operator places his hands over the forehead and gently draws the head well backward several times.

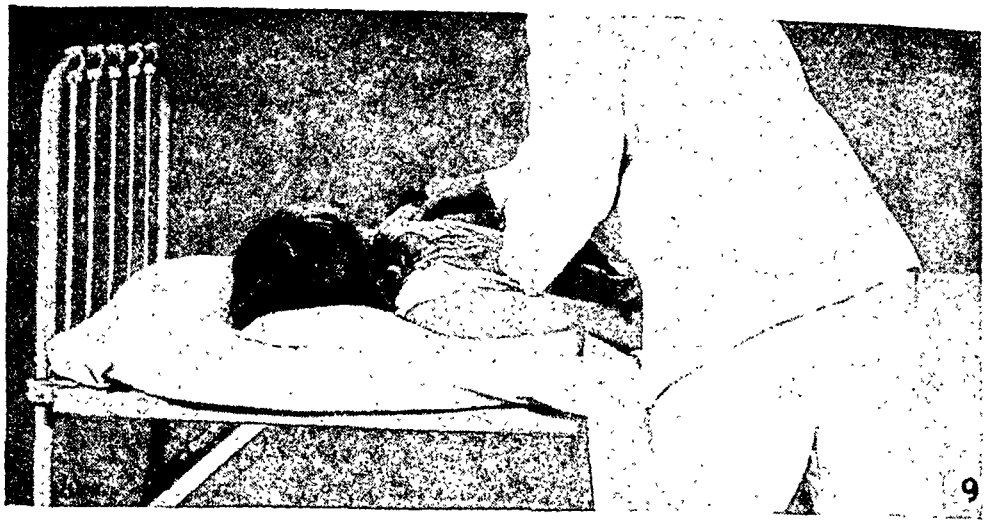




SPECIAL MANUAL TREATMENTS (Continued).

7. The patient lies prone, with the right cheek on the pillow. The operator grasps the left shoulder with his right hand. He places his left hand on the side of the patient's head, pressing the head downward and backward, thus getting a maximum stretch on the tissues of the side of the neck. The position is now reversed in order to treat the other side of the neck, the operator standing on the other side of the patient.

8. The patient lies prone. The operator places his left hand firmly on the spine between the shoulders, and with the right hand grasps the right shoulder and pulls it straight backward as far as possible, while maintaining the firm pressure on the spine. He then goes to the other side to treat the other shoulder.

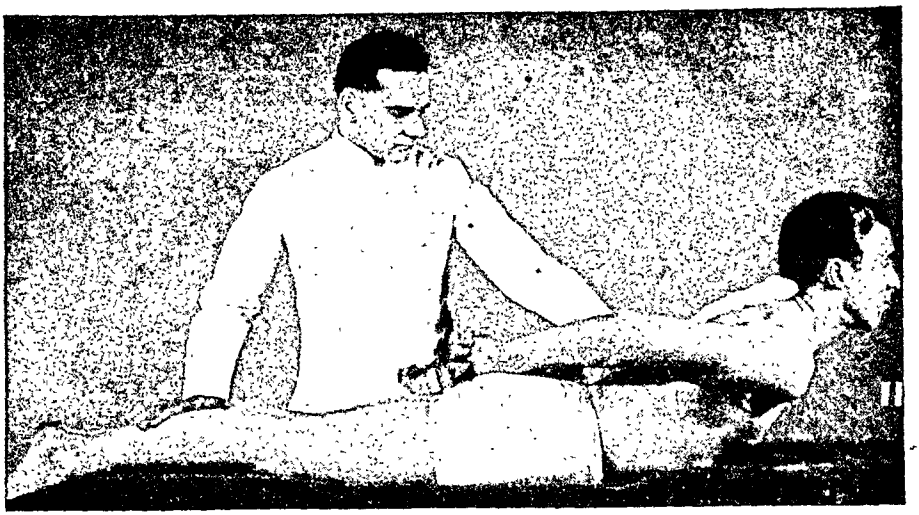




SPECIAL MANUAL TREATMENTS (Continued).

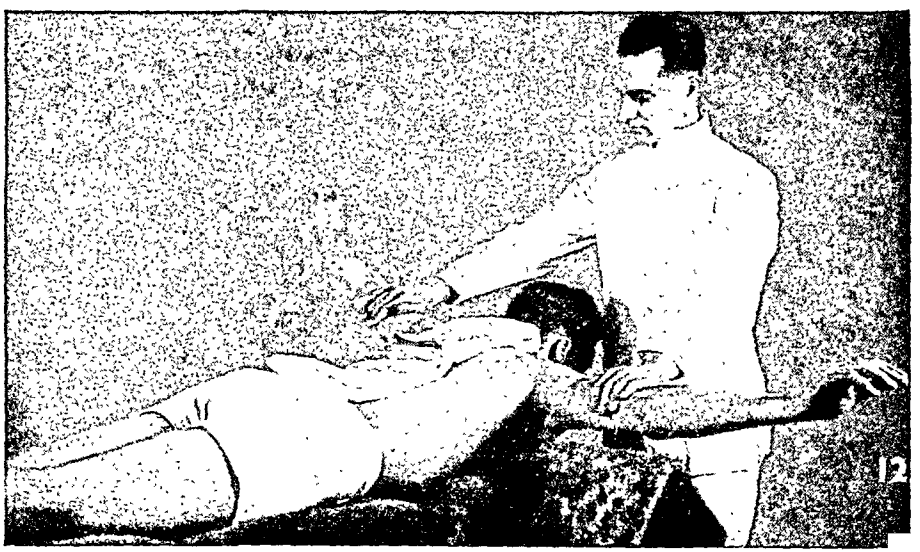
9. The hands are placed in the same position as in the preceding movement. The right shoulder is then given a rotary treatment—pressed upward, backward, downward, forward, each direction three or four times before proceeding to the next direction. Similar treatment is given the left shoulder with the operator on the other side of the bed.

10. The operator grasps both shoulders, presses down on the left shoulder, pulling up on the right, thus twisting the body from the waist. This is done four or five times. The movement is repeated by twisting the body in the opposite direction.

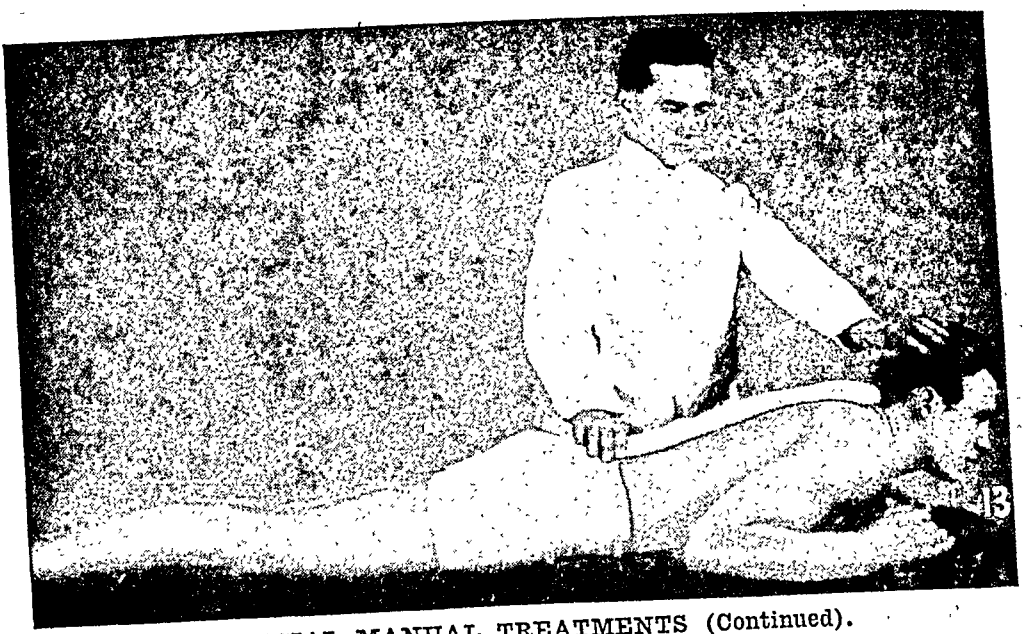


SPECIAL MANUAL TREATMENTS (Continued).

11. The patient lies prone. A hot towel is placed along the spine. The operator places one hand on the legs and the other on the small of the back. The patient is then instructed to clasp his hands behind his back and to raise the head as far as possible by pushing the hands downward. The operator maintains firm pressure on the legs, but only sufficient on the back to keep the towel in position.

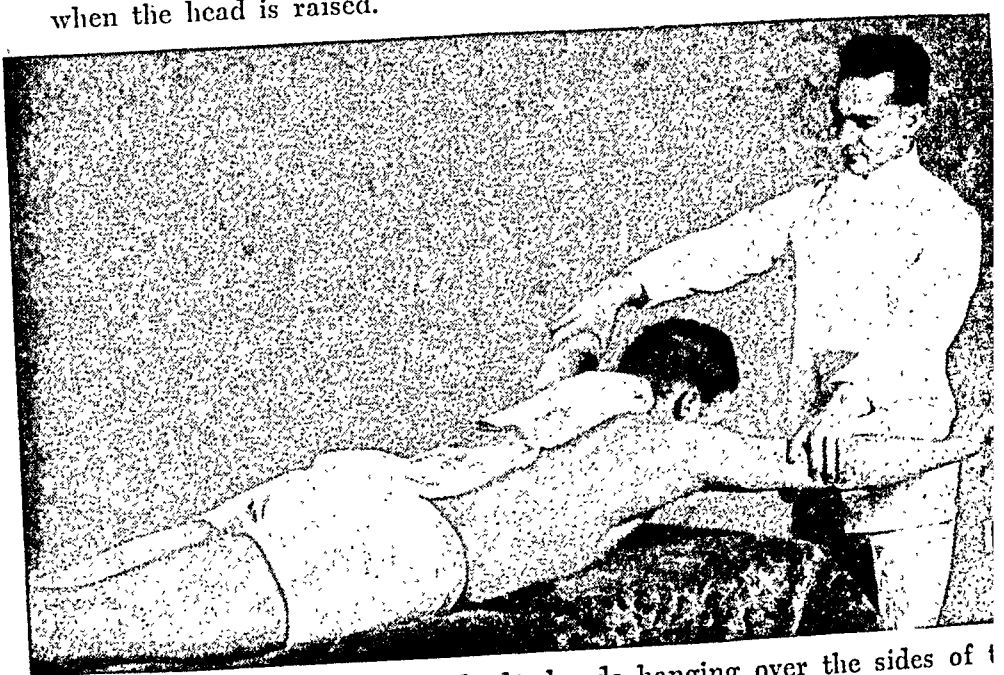


12. With a hot towel along the spine, the patient lies prone on a narro table or couch with the arms hanging over the sides. The operat places his hands upon the patient's upper arms. The patient is th instructed to raise the arms to the horizontal position, while the ope ator resists the movement. The stronger the patient, the greater shou be the resistance.

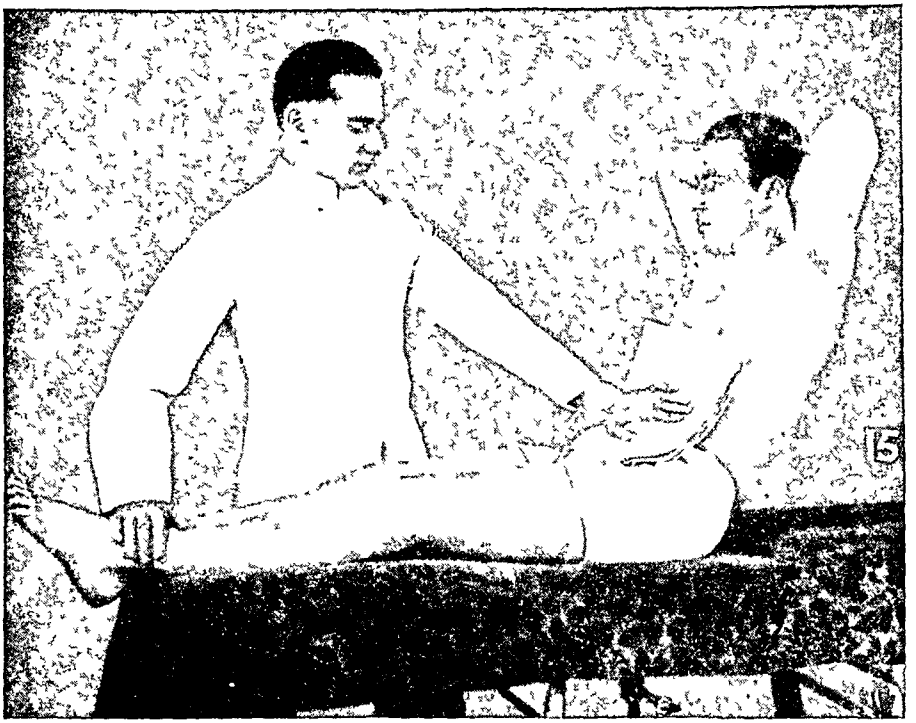


SPECIAL MANUAL TREATMENTS (Continued).

13. With a hot towel along the spine, the patient lies prone, with the head hanging downward over the edge of the table. The operator places one hand on the small of the back and the other on the back of the head. The patient now raises the head backward as far as possible, the operator resisting the backward movement. The resistance ceases when the head is raised.

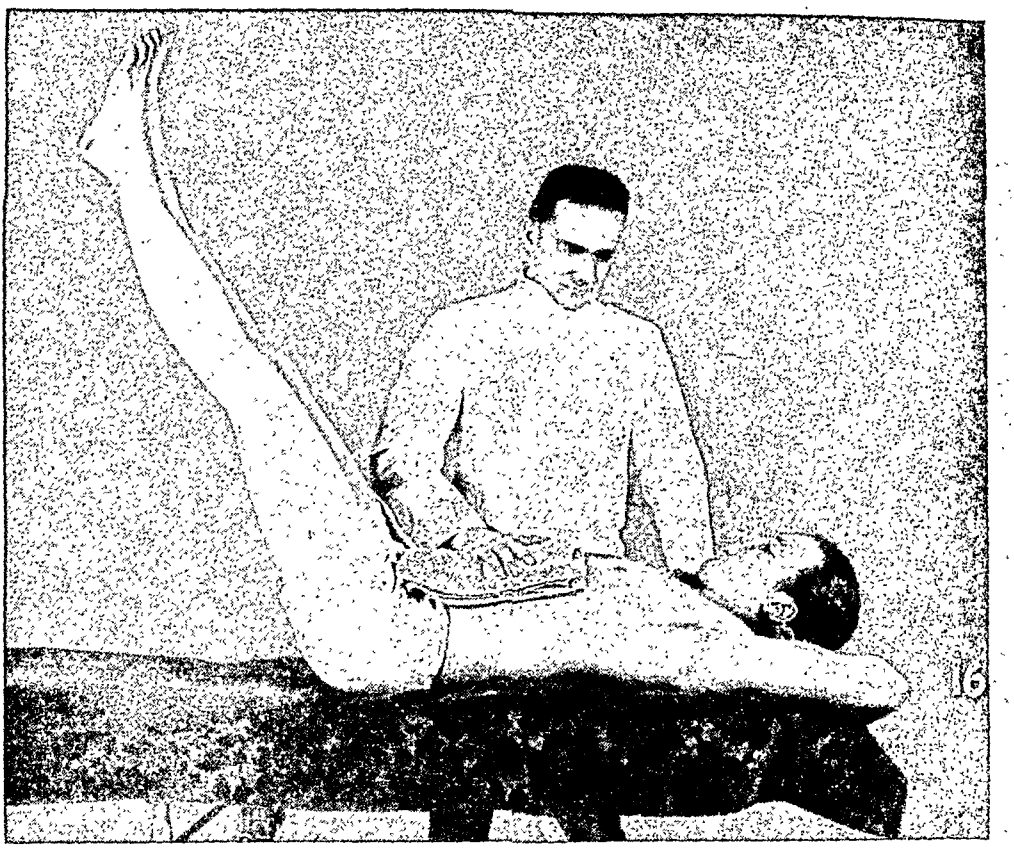


14. The patient lies prone, with the hands hanging over the sides of t treating table. The operator takes hold of the patient's arms a draws them forward and forces them backward several times. T patient may resist the movements.



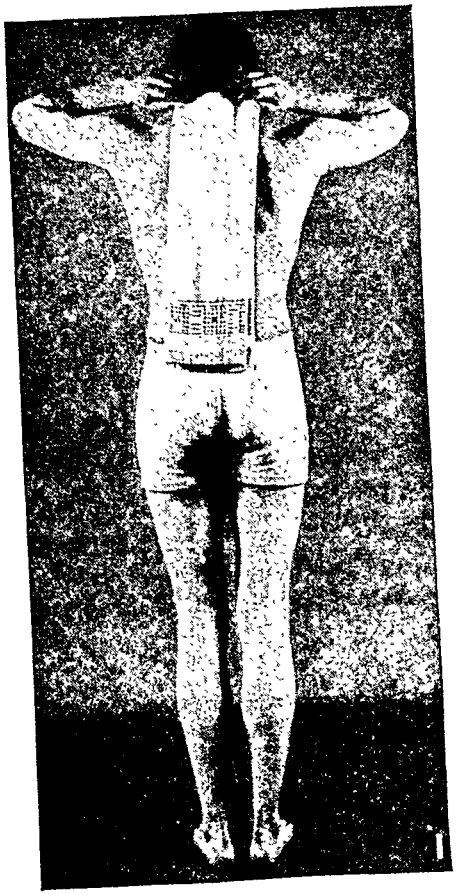
SPECIAL MANUAL TREATMENTS (Continued).

15. The patient lies on the back, a folded hot towel on the abdomen. The operator stands with one hand on the abdomen, the other holding the ankles. The patient clasps his hands behind his head and raises the body as far as possible. This is repeated several times. If this movement is too difficult the patient may place his hands on his abdomen or along his sides.



SPECIAL MANUAL TREATMENTS (Continued).

16. The patient lies prone, a hot towel on his abdomen. The operator has one hand on the patient's abdomen, the other on his shoulder. The patient is then instructed to raise and lower the legs several times.

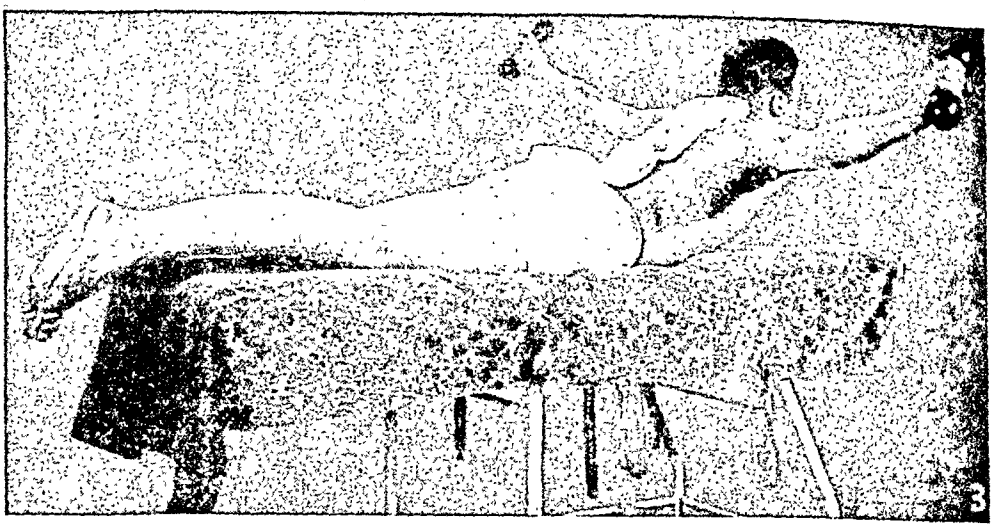


SELF-APPLIED EXERCISE MOVEMENTS

1. In the application of a hot spinal compress, the bath towel is first wrung out in very hot water and doubled as in the picture. It is then applied (if by the patient himself) by swinging it over the shoulders. The temperature should be as high as the patient can stand it.

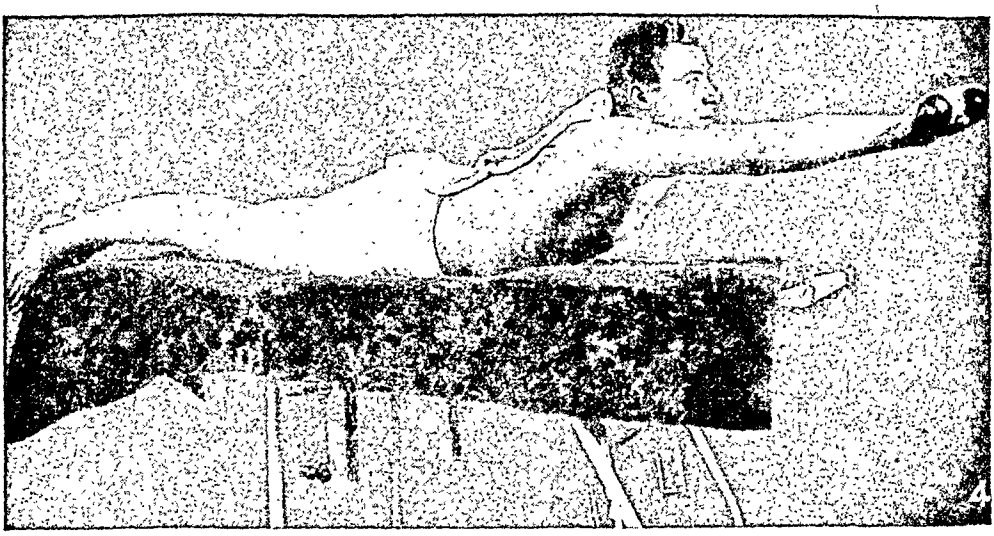


2. The patient then lies down in the position illustrated. The compress should be pressed tightly around the nape of the neck. The hot compress should be renewed several times, in order to maintain a fairly constant and a maximum heat. The patient clasps the hands behind the back, pressing down with the arms on the back. The head is raised, while thrusting the hands downward. Return to the original position and repeat the movements several times.



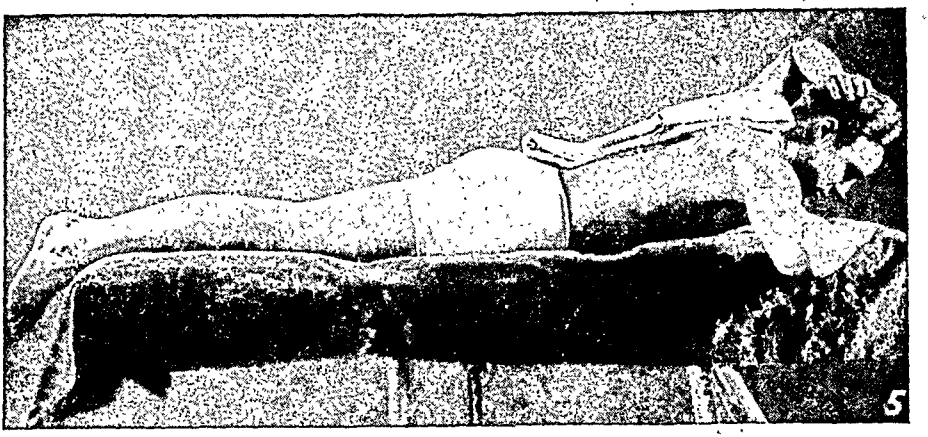
SELF-APPLIED EXERCISE MOVEMENTS

3. With a hot spinal compress in position as shown, the patient holds dumb-bells in his outstretched hands and then lifts the arms upward simultaneously, also lifting the chest. Return to original position and repeat until slightly tired.



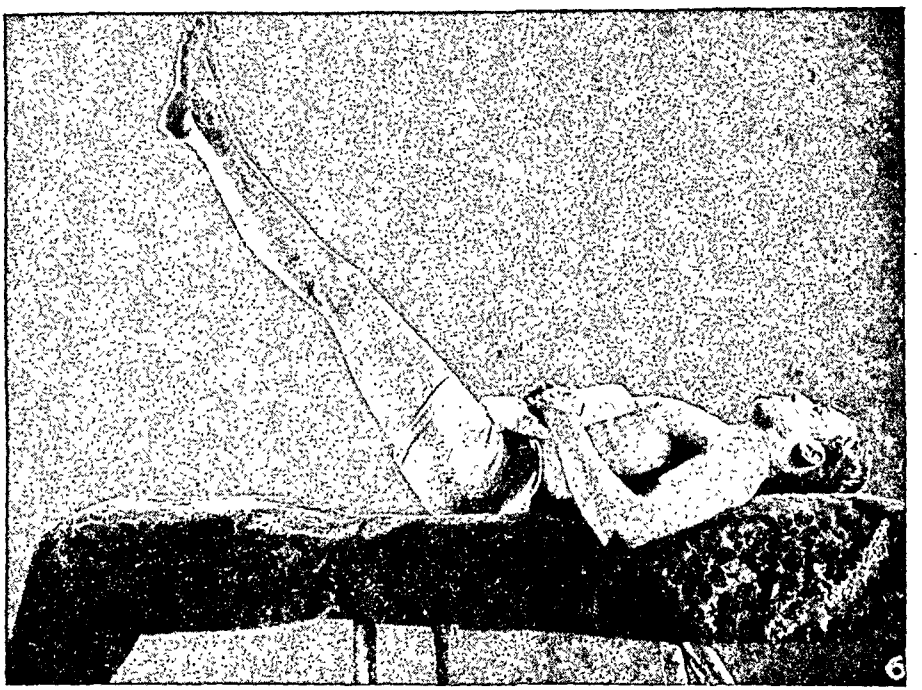
SELF-APPLIED EXERCISE MOVEMENTS

4. Again with the hot spinal compress in place, the patient lies on the table, grasping the dumb-bells in front of him, then raises his head and the dumb-bells as far as possible, keeping the elbows stiff. If the patient lies on the table with the head and shoulders over the edge, he will get a better exercise with the lower movement of the dumb-bells in coming back to first position.



SELF-APPLIED EXERCISE MOVEMENTS

5. With a hot spinal compress in place, place the hands as in illustration. Then raise the head against the resistance of the hand. Reverse the hand and repeat the exercise several times.



SELF-APPLIED EXERCISE MOVEMENTS

6. The patient lies on his back and applies a hot pack over the abdomen. He crosses the hands on the abdomen, pressing on the pack. He maintains a restful position for three or four minutes. The legs are then raised up as in the illustration, and down, several times. As an alternative, the legs are strapped to the table and the trunk moved up and down several times.



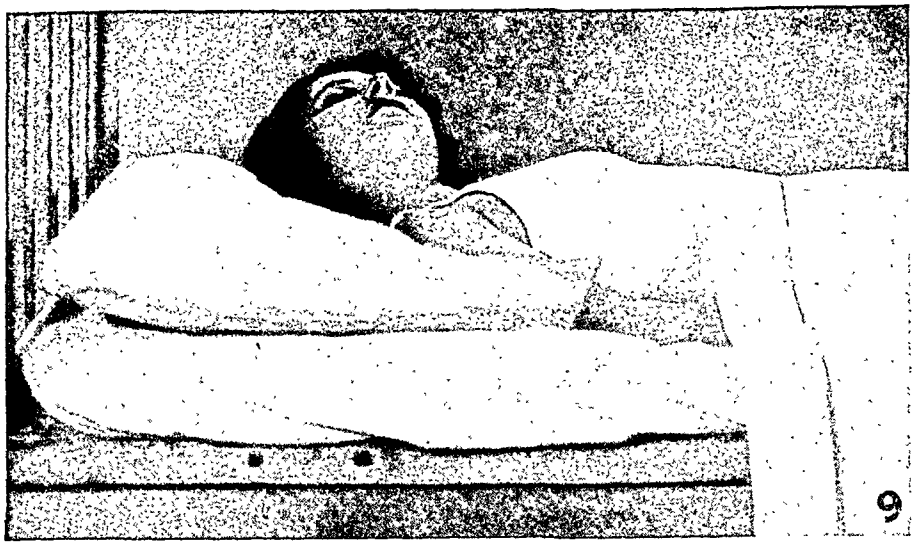
SELF-APPLIED EXERCISE MOVEMENTS

7. The patient lies on the back and raises the head upward and forward as far as possible. Eventually, the patient should be able to bring the chin down on the chest.



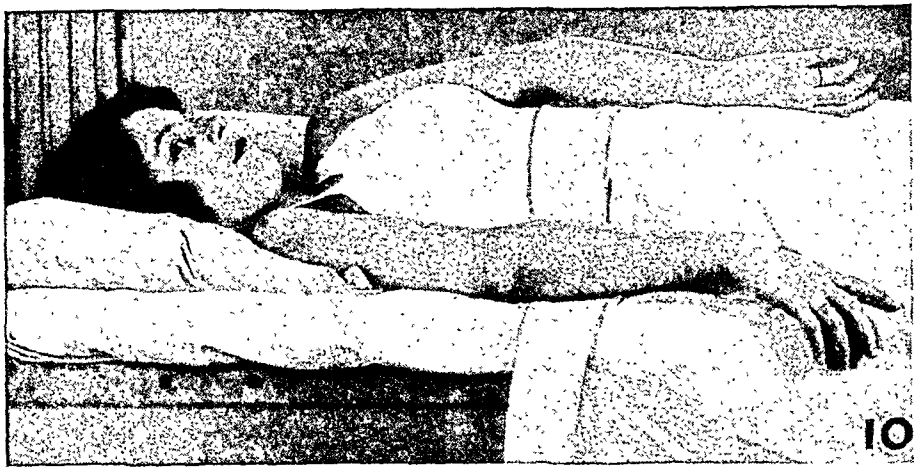
SELF-APPLIED EXERCISE MOVEMENTS

8. With the head in the raised position, as in 7, the patient should turn the head from side to side as far as possible without jerking.



SELF-APPLIED EXERCISE MOVEMENTS

9. Reclining on the back with head very slightly raised, move the neck from side to side until the head touches the shoulders on each side. Repeat several times.



SELF-APPLIED EXERCISE MOVEMENTS

10. Lying on the back, the patient tries to turn the body over, bringing the hips and limbs completely around, while keeping the shoulders facing upward and moving as little as possible. Return to first position and repeat the movement from the other side. This exercise is repeated five or six times on each side.



SELF-APPLIED EXERCISE MOVEMENTS

11. The patient lies prone, keeping the hips as nearly rigid as possible. The patient raises the left shoulder as high as possible and returns to the original position and repeats from five to ten times. She then goes through the same movement with the right shoulder.





SELF-APPLIED EXERCISE MOVEMENTS

12. The patient, lying on the back, grips the side of the bed, then endeavors to lift her body up by means of the arms. The body is lowered and the movement repeated from five to ten times.
13. In a sitting position, supported by the arms, as in the illustration, the patient twists the body as far as possible to the right and then to the left, several times.





SELF-APPLIED EXERCISE MOVEMENTS

14. Supported by the hands in a sitting position, the body is bent forward so that the face touches the limbs, if possible. The patient then comes back to the original position, and repeats from five to ten times.

15. Grasping the bed on the side while in a sitting position the patient twists the body as far as possible to the right, then back, forward and returns to the first position in the reverse order. She then reverses the movement by turning to the other side. Repeat from five to ten times.

Conditions may require two light treatments daily instead of one heavy treatment. If more than one part needs particular attention, but the patient is too weak to have them all worked on at once, treatment of the parts may be altered on different days. It may seem strange that manipulation should be given to such a weak patient, but manipulation without the exercise will often be well borne when even massage would prove too exhausting. At the same time the effects are deeper and more lasting.

The frequency with which the treatment is given will depend upon whether it is general or local, light or heavy, and on the condition of the patient from day to day. A general treatment is usually given three times per week, but a strong person could take it every other day, or four times per week. A light general treatment may be given five or six times a week for a limited period of time, if conditions seem to indicate it and little or no other treatment is being given. Very heavy treatments including considerable exercise may have to be limited to two a week, but as these are seldom given except to advanced patients, three a week should not be too much. If manipulation is especially needed it may be permissible to give a light general treatment three times a week and the heavier treatment with exercise twice a week. Local treatment may be given once or twice a day, six days a week. No matter what form of treatment is employed, a one-day rest period each week should be strictly observed; and, if it is necessary to keep up treatment for a long period of time, a week of rest every four to six weeks is advisable. If one is always governed by the patient's reactions, one will not go wrong. As long as the patient enjoys the treatment and feels better afterward, benefit will be assured.

Frequency of Treatment

The illustrations given herewith, with their accompanying captions, should be carefully studied, in order that the movements may be correctly given. If the directions are followed exactly, not only will the patient react better to the treatment, but less exertion will be required on the part of the operator. Anyone who is really interested in learning to give this most effective treatment should have no difficulty in doing so if he will carefully study the instructions presented.

As regards the self-administered treatment, no additional

directions will be needed, as all that has been said so far applies also to that form of treatment. The same method of applying the movements, using the little extra pressure at the end, is employed. It is comparatively easy to treat one's own neck, arms, and legs, but, in the case of the trunk, treatment may have to be applied by pressing or pulling against some external object, or by using one set of muscles against another. The illustrations will make this clear.

SUNLIGHT A FOE TO DISEASE

Section 4

THERE can be no challenging the statement that sunlight is a fundamental biological need, ranking with oxygen, water, and food in importance. This fact is lost sight of by most people because instant or early death does not result from denial of sunlight to the body, as is the case when oxygen, water, and food are withheld more than temporarily. The reaching out of plants and flowers toward sunlight or daylight, the basking of the lizard on the sunlit sand, the lazy stretching of animals in the glowing warmth of sunlight, the "soaking in" of the life-giving actinic rays by humans, in comparatively small numbers unfortunately, exemplify natural reactions of organic life to the primordial activating force of all life.

Sunlight and Life

For untold centuries the sun has been worshiped as the visible symbol of the creative power. More than three thousand years ago Akhnaton, the Egyptian high priest and king, founded the religion of the god of the sun. As one writer has expressed it, "The rays of the sun made pregnant the whole earth. The god of the sun was the god of fecundity, fertility, generation, reproduction, and the like, in the human, animal, and vegetable kingdoms." A thousand years before the Christian era, Zoroaster (or Zarathustra) taught the sun cult to the Persians. However, Herodotus, the Greek historian, set down in his writings in 431 B. C. that the skulls of the Persians found in certain locations were so soft that holes could be broken through them with a small stone, showing that, though foremost among the sun-worshipers of all ages, these people did not practice sun-bathing. They wore their tiara hats from childhood. Over five hundred years after Zarathustra, Hippocrates practiced the sun-cure in the great Health Temple of Esculapius on the island of Cos, where also was put into practice a system of hydrotherapy, very extensive for that day and age.

It is well to mention here that this great Greek physician, whom the medical profession today delights to honor with the appellation "Father of Medicine," used what are generally called *medicines* (drugs) very little, but relied upon sunlight, hydrotherapy, diet and water-drinking, rest, and gymnastic exercises. Comparatively recent excavations (early in the present century) have disclosed the temple of health erected by or for Hippocrates almost twenty-five centuries ago, which it would be well for health authorities to copy in some respects in the construction of their hospitals and sanitariums, as it would be well to duplicate the excellent system of physiotherapy practiced therein.

Antiquity of Sun-bathing

From the dawn of history the sun has been utilized specifically as an aid to the restoration of health and as a means of maintaining and increasing it. The ancient Greeks and Romans, Egyptians and Assyrians, Arabians, Babylonians and Cretans, the Aztecs and the early Chinese and Japanese, the inhabitants of India and most of the other nations that were glorious in their day, derived their superb health partly from their contact with the rays of the sun, and healed their ailments by their aid. It is claimed that the Incas of Peru, the ruling clan of which was reputed to have descended from the sun, cured many grave skin disorders by exposure to the sun's rays. We find in the writings of Aristotle, Herodotus, Cicero, the Younger Pliny, Celsus, Galen and other writers, philosophers and physicians of early times, that heliotherapy was quite extensively used in their day. In fact, it is stated that the solarium was a part of every dwelling-house of the Romans, as it was in Pompeii, that ill-fated city of Campania, which was buried under the lava of Vesuvius in 79 A. D.

Then, as Christianity made its rapid conquest of the ancient world, came the period of history called the Dark Ages, which may be considered as all or part of the Middle Ages from the sixth to the thirteenth centuries. During this period there was mental, physical, and moral decline or stagnation, with the cloak of superstition and ignorance blotting out most of the arts and sciences of Europe, as well as many hygienic and therapeutic achievements. Ignorance encouraged the belief that the body was evil and that it was a virtue to neglect it. Sun-bathing and light-healing fell into disfavor as "pagan

practices"; illness was neglected or treated by ignorant methods. Millions of people remain today in the Dark Ages in their attitude toward their bodies. Only when we pass through this vicious and ungodly state and develop a reverential feeling toward the physical shrine that is our earthly habitat shall we be able to develop the physical structure, strength, and health possessed by the great peoples of former centuries.

Not during the whole of the Dark Ages do we find evidence that the sun was recognized by European peoples as a hygienic and healing factor. But Avicenna, a Mohammedan Arabian physician, who flourished about 1000 A. D., taught that exposure to the sunlight, with physical activity, gave immunity to disease. It was not until late in the eighteenth century that sunlight again received attention as a possible factor in promoting, restoring, or maintaining health. Late in the seventeenth century, Sir Isaac Newton discovered the solar spectrum. However, the infra-red rays were not discovered till 1800, and the ultra-violet not till 1801. For several years immediately following this many valuable discoveries were made in the field of photo-chemical effects, dealing with the action of certain rays of the spectrum.

Avicenna and Sunlight

Newton and the Solar Spectrum

In the meantime a French physician, Faure, revived the treatment of open ulcers by their direct exposure to solar heat at about 106 degrees, obtaining excellent results which he attributed to the action of the heat rays. At the same time two other Frenchmen, Le Peyne and Le Comte, began treating wounds, ulcers, and cancerous tumors by sunlight refracted and concentrated by lenses. Thus began the rebirth of an ancient science which has not yet come into such general use as it apparently enjoyed many centuries ago.

Early Experiments

The year 1815 was an outstanding one in heliotherapy. In that year Loebel presented a valuable paper on the sun-bath, in which were mentioned indications and contraindications. Loebel also constructed a special cabinet for sun-baths, having the top and walls of glass and the floor covered with salt or sand. Partial sun-baths were also used by Loebel. In the same year Cauvain published an important paper on the benefits of insolation (exposure to sunlight, though the term is now used more frequently to denote sunstroke); and in 1816 appeared a work detailing the principles of phototherapy based

upon experiment. The author of the latter work was Dobereiner, the first man to take up sun-bathing scientifically. From this time on the science has gained in dignity and prestige. During the middle of the nineteenth century, several Frenchmen did noble work also in spreading the doctrine of the sun-bath as a healing factor of first importance, especially in tuberculosis and scrofulous conditions.

Dobereiner and the Sun Bath

In 1893 Finsen, a famous Danish physician, first reported the results of his use of sunlight in the treatment of some forms of tuberculosis. By means of a special apparatus in which the heat rays of the sunlight were absorbed by filtered water passing before the lens, lupus and other skin disorders were treated successfully by Finsen. He also devised other special lamps for giving forth highly actinic light derived from sunlight or some form of electric lamp. His work and results have done much to put heliotherapy and phototherapy on a sound and scientific basis. By means of colored glass he also excluded the actinic rays from hospital wards containing smallpox patients, and was able to see them convalesce without any pitting. The German physicist Roentgen, in 1895, first gave the world knowledge of the x-rays, so called by him because their exact character was not known, but now generally called, after their discoverer, "Roentgen rays." Since this time every phase of light treatment, by both natural and artificial means, has been scientifically investigated, and we now know something of the way in which sunlight produces its effects, though there still is much to learn.

Finsen and His Lamps

Roentgen Rays (X-rays)

In 1903 Dr. A. Rollier, a Swiss physician, established at Leysin, in the Swiss Alps, the first European clinic for the systematized sun-cure of bone and other tuberculosis formerly considered surgical in nature; that is, requiring surgical treatment. The marvelous results achieved in these cases without surgery, and in other forms of tuberculosis and nutrition defects, led to the adoption of similar methods in England and America, and did much to restore sunlight to its primary place in hygiene and medicine. Along the Mediterranean, at Bordeaux, in Vienna and Jerusalem, at Rome and Cologne, in England and in America, there appeared clinics, and sanitaria and solaria, for the treatment of tuberculosis, malnutrition, and other maladies by heliotherapy. Today the value of the

Rollier in the Swiss Alps

sun-bath as a prophylactic and therapeutic factor is recognized by all intelligent practitioners.

Sun the Source of Life and Energy

Take away the rays of the sun, exhaust the sun's energy so that it becomes a mere reflecting, lifeless orb floating in the heavens, and the life that began and progressed on the planet Earth only through the aid of the sunlight would disappear; the planet itself and most of the heavens known to us would again become black and cold. Certainly the *source* of all life and energy upon the earth must be of tremendous value in vitalizing the human body and in building health. But in order to understand the healing agent to which even savages and wild animals instinctively turn in time of sickness, it is well to have some knowledge of the composition of light and its physiological and therapeutic effects. The average person may be satisfied with knowing that light-rays do have physiological and therapeutic effects and care little what radiant energy, ultra-violet and infra-red (also called ultra-red) rays really are. But a little further information can do no harm and will be desired by those whose interest or curiosity is along more or less scientific lines.

Theories of Light

One theory of light, the electromagnetic, is expressed in Sir Oliver Lodge's very good but limited definition: "Light is an electromagnetic disturbance of the ether." The Newtonian theory was that light was an actual substance, consisting of minute material particles or corpuscles sent in all directions from luminous bodies. This theory was discarded long ago. The present generally accepted theory is that "light is transmitted from luminous bodies to the eye and other objects by the undulatory or vibrational movement of the ether." (Webster, *New International Dictionary.*)

The Spectrum

When a beam of sunlight is passed at a certain angle through a spectroscope (a transparent prism), the white light we might expect to see on the other side is broken up into a beautiful band of colors, the same that we see in a rainbow. This is called the *visible, ocular,* or *chromatic spectrum,* beyond which on each end is an invisible spectrum. Beyond the red end we have the *thermal,* or *heat spectrum*—infra-red rays, which are *heat waves;* and beyond the violet end we have the *actinic,* or *chemical spectrum,* the ultra-violet rays—including the near ultra-violet, the far ultra-violet and the extreme ultra-

violet. It might be stated here that some authorities classify the infra-red rays, also, as near, far, and extreme.

It is not necessary to go into the measurement of wave-lengths in order that the effects of irradiation by ultra-violet or infra-red or luminous rays may be secured or appreciated. The unit of measurement is arbitrary in any event, though accepted by scientists. But a brief description of these wave-lengths may be interesting and instructive.

The Angstrom Unit

The unit of wave-length measurement is known as the Angstrom unit (after a Swedish physicist of the last century), with a length of one ten-millionth of a millimeter (one two hundred fifty-four millionth of an inch), this denoting the separation between the extreme ultra-violet rays and the softest x-rays, just beyond. Still beyond the soft x-rays are the extremely short hard x-rays, and beyond these still are the radium or gamma rays.

The wave-lengths increase rapidly toward the visible spectrum, the extreme ultra-violet being from 00 to 2,000 Angstrom units, or Angstroms, the middle ultra-violet ranging from 2,000 to 3,000 Angstroms, and the near ultra-violet from 3,000 to 3,900 Angstroms. At this point the rays become perceptible to the eye and the visible spectrum begins, the wave-lengths of which range from 3,900 Angstroms for the deepest violet, through the violet shades, indigo, blue, green, yellow, orange, and reds, to about 7,700 Angstroms for the deepest red. Here the visible spectrum ends and the thermal or infra-red spectrum begins. The near infra-red wave lengths are from 7,700 to 20,000 Angstroms, the middle from 20,000 to 500,000, and the extreme infra-red from 500,000 to infinity.

There is little that is tangible about some of these rays, as yet, for no means have been devised for producing them even for experimental purposes. Scientists speak of wave-lengths in the millions and even in the trillions as if they had actually been measured. For instance, the high-frequency machines are calculated to give vibrations with wave-lengths of around three trillion Angstrom units. This is beyond the comprehension of the human mind. Some of these extreme wave-lengths are further discussed in the following section, on *Artificial Sunlight* and *Phototherapy*.

In addition to the length of the wave, its frequency or

velocity is of importance in affecting the action of the rays. The shorter the wave-lengths the more rapid will be the vibratory frequency. This may be illustrated by a pendulum: the shorter the pendulum, the more frequently will it oscillate. The infra-red rays have a much greater wave-length than the ultra-violet rays, and, therefore, their vibration is less rapid. However, this knowledge is of no practical value to the layman.

We know that sunlight gives us light, heat, and chemical action of a peculiar kind. The spectrum has shown us this, by revealing that these various forms of energy do not all come from the "light" of the sun alone. The heat is produced by the infra-red (long, invisible) waves, light especially by the shorter waves (visible), and actinic, or chemical, action pre-eminently by the ultra-violet (short, invisible) waves or rays. From the sun's rays we receive wave-lengths from 2,900 Angstroms (in the middle ultra-violet region) up through the visible spectrum into the near infra-red region to about 8,000 Angstroms. Treatment by these wave-lengths of sunlight we call heliotherapy.

Properties of Sunlight

It is upon this range of wave-lengths that all animate things upon the face of the earth depend for their existence. That is, the sunlight does not separate the rays, does not isolate any one of the three divisions, but gives us the entire visible spectrum and a fair share of the ultra-violet and infra-red rays. Thus the sun, through its rays, is not only the greatest source of life but is also the greatest preserver of life. Upon these facts heliotherapy and its offspring phototherapy are based—the former being treatment of disease by exposure to the direct rays of the sun (from Greek *helios,* sun, *therapeia,* treatment), the latter (sometimes called physiotherapy) being treatment by light, heat and ultra-violet rays from sources other than the sun (Greek *phōs,* light, *therapeia,* treatment). The Greeks called sunlight treatment *Heliosis.* We shall see later on how certain factors, chiefly man-made, serve to reduce the solar rays to such an extent that, while life may remain, health is greatly impaired.

Heliotherapy

Now that we have learned something of light rays and wave-lengths, let us see what the influences of these rays are upon the body.

It is the opinion of practically all who have studied light in its relation to health and those who have specialized in healing by its means that the rays having the greatest and the most beneficent influence upon the health are the *ultra-violet*. Yet specially devised lamps that yield large quantities of ultra-violet rays and practically no others sometimes do not compare with the natural sunlight in beneficial influence upon the body, pronounced as their influence is. Also, a tremendous influence upon various abnormal conditions is exerted by lamps yielding no ultra-violet rays, but only the infra-red rays. Even the incandescent bulb used in the ordinary home, when fitted in a special reflector, may have a favorable effect, even though yielding neither ultra-violet nor infra-red rays. Thus it appears that no single division of the sun's rays, whether produced by the sun itself or some mechanical device, will do for the body, in health or in disease, what the entire solar spectrum will do. Still, no one yet understands just what the curative power of sunlight is, or just what takes place in the body under its influence. Certain superficial effects, such as the stimulation of the sweat glands and the dilation of the cutaneous blood-vessels, with hyperemia of the skin, are obvious, but what other physiological processes attend these manifestations is imperfectly understood, and the manner in which they are brought about largely a matter of conjecture. All we really know about the latter is that a chemical substance called *ergosterol* acts as a messenger, carrying the mysterious potencies of the rays through the blood-stream.

Superficial Effects

Simultaneously with the surface reaction upon exposure to the rays, some internal deeper action takes place, more subtle and of vastly greater importance. To what extent this action is due to the surface absorption of radiant energy and the resulting cutaneous changes remains to be seen; but without doubt there is a direct relationship between them, a direct dependence of the internal upon the superficial reaction and change. Rollier has discovered in his broad experience with tuberculous infections of all tissues and regions of the body that the degree of pigmentation, caused by the ultra-violet rays, is indicative of the tendency to recovery.

Deeper Effects

We do not need to go into a discussion as to the method

or possible method by which pigment is deposited, for nothing definite has been determined regarding it. As in the case of many scientific subjects, there are different opinions which need not occupy our attention here. It is sufficient to say that the pigmentation, popularly known as *tanning,* is a prominent superficial effect of the actinic rays and is the result of melanin granules forming around the nucleus of certain skin-cells. *Melanin* is merely the special name for pigment granules, which may be dark brown or black.

Pigmentation or Tanning

Pigmentation or tanning evidently is Nature's spontaneous defence against the absorption of an excessive amount of sunlight or of some of its rays. But it is more than this, as we have seen and shall see further.

Sunburn

We all know from painful experience what happens when there is prolonged exposure before there has been time for this protective tan to form. Inflammation ensues, blisters are often formed, and the skin peels off—in the typical "sunburn." But after tanning has taken place sunburn, or *erythema solare,* will not develop. We need only note this effect of the actinic rays, however, to appreciate this potency. Sunburn is not, in reality, a burn at all, for it does not appear for several hours after the causative exposure; it is simply an erythema or inflammation resulting from irritation by the peculiar action of the ultra-violet rays. It can be produced even more quickly by some of the special phototherapeutic lamps than by sunlight, owing to the greater amount and greater concentration of actinic rays in the light from the lamps. But whether by natural or artificial light, the more intense the light the sooner will the reaction appear and the longer will it remain; also, the closer the body is to the light yielding ultra-violet rays the more prompt will be the reaction.

Pigmentation and Deeper Effects

As has been noted, pronounced internal changes accompany the pigmentation, changes which some heliotherapists and physiotherapists have regarded as a result of the latter. This view is no longer accepted *in toto;* but certainly such a pronounced change as deep pigmentation of an organ of such essential value to life as the skin must have an appreciable influence upon the entire body. Rollier suggests that pigment is a means of changing short waves into waves of greater length, which are regarded as less capable of absorption by the

skin. He asserts that, because his patients with deep-seated tuberculosis are cured when they become deeply pigmented and those who do not pigment respond far less favorably to the treatment, the pigmentation must render possible the deep penetration of the long rays. This theory would suggest that the long, heat rays are the curative rays, while the short, actinic rays are merely servants preparing the way so that the heat rays may enter the body. Needless to say, when a ray is absorbed, its penetration is ended at that point. If ultra-violet rays are all absorbed by the skin, they penetrate no further; and the effects produced by them upon the body must be through their effects upon the skin—or the blood in the skin, or both. Few authorities hold, however, that these rays are absorbed entirely by the skin. The wave-lengths of all the spectral rays are doubtless of such a nature that they vary in depth of penetration, yet that each, in some degree, penetrates beneath the skin.

Chemically Active Rays

But, even without a full explanation of its nature and significance, we must conclude that pigmentation is of value to the body. We know that sunlight or light irradiations cause it to take place, and with it very definite physiological changes occur. These facts and the fact that pigment is present in some degree in practically every living being are evidence that it has some very important bearing upon vital activity. When we consider that by clothing the majority of people have bleached their bodies until pigmentation is reduced to the minimum, we are forced to conclude that this loss, as well as the conditions causing it, contributes much to the present low state of the general health.

The chemically active rays are the blue, the visible violet, and the ultra-violet. These latter are the rays whose luminous frequencies are greater than those of the visible spectrum. The term, which covers invisible as well as visible rays, is applied because these rays lie just beyond the visible violet (*ultra,* beyond). Ultra-violet rays are invisible. They are also known as the *actinic* rays, because of their power to cause chemical change and because their effect upon photo (light) sensitive paper is more marked than that of any other of the light rays. For the same reason the term *chemical ray* is used, but it is not altogether correct, since the infra-red rays

also have a chemical effect. "Where intense radiation is intercepted by a body, chemical action," as Steinmetz, the electrical genius, has said, "may result from the heat energy into which the radiation is converted." "The action of the infra-red radiation on plant life," he tells us, "is a chemical action and this is the most important of all chemical actions, as upon it depends the life of all vegetation and hence of animal life and thus of our lives." Yet the ultra-violet rays evidently have greater chemical power than the infra-red. It may be that the ultra-violet rays are transformed into chemical energy at the numerous points of their absorption. *Certain it is that irradiations by light containing these rays exert powerful influence upon living cells,* as we shall see still further as we proceed.

Proof of Existence of Ultra-violet Rays

A visible proof of the existence of ultra-violet rays is found in the iridescence which these rays produce in many substances which absorb and retain them, such as solutions of quinine and kerosene oil. Curiously enough, these invisible rays make visible many things that otherwise would be invisible, as in the photographing of invisible writing done with a quinine solution. It has been stated that, through the influence of these rays, a photograph will reveal the presence of smallpox eruptions before the naked eye can perceive them at all.

THE PHYSIOLOGICAL EFFECTS OF LIGHT.—Let us see just what effects are produced by sunlight, as now understood. The two classes of effects are: chemical-ray action and heat-ray action. These are combined in sunlight treatment, but will be considered separately for the sake of clearness.

We have observed and sufficiently discussed the pigmenting or tanning effect of the ultra-violet rays. The deeper effects previously mentioned will now be discussed briefly.

Direct Effects of Ultra-violet Rays

In some mysterious manner the simple mineral elements that we know to comprise plant and animal tissues are held together in the plant, in complex molecules, by the chemical energy of the ultra-violet rays. When this vegetation is consumed by us, digested, and absorbed, the light energy is liberated and provides energy for our life processes. Thus we derive from the right kind of foods not only the mineral elements we now hear so much of, and the basic elements, the proteins, carbohydrates, and fats, but stored sun-

light as well—which may be, for all we know as yet, the vitamins or the source of them. It has been found by experimentation that foods irradiated by ultra-violet rays before consumption have a more pronounced influence upon growth and the prevention or correction of rickets than foods not so irradiated, thus indicating that even foods that are no longer growing are able to absorb some of these rays and liberate them in the body upon their consumption. It has also been found that, in the treatment of rickets, sunlight and cod-liver oil (containing the anti-rachitic vitamin) are to a certain extent interchangeable.

Ultra-violet Rays Increase Blood Elements

We have just seen that a tremendous yet indirect influence is exerted upon the body by ultra-violet rays. We shall now see what the more direct effects are.

The blood-vessels are the first structures affected by light. Those parts of the skin that are regularly exposed to light possess a much more pronounced circulation than those portions that are commonly or always covered; they have a much greater resistance to temperature changes, and a greater degree of resistance generally. Possessing better circulation, they are darker and ruddier. The blood-vessels are more numerous and more widely dilated. Such parts are much more slowly and pronouncedly affected by prolonged exposures to sunlight than those less exposed.

Some authorities claim that the hyperemia is the most valuable result of exposure to these rays. Hyperemia is merely an increase of blood in a part, but that produced by exposure to ultra-violet rays is an active hyperemia (due to an increased inflow of blood, as distinguished from passive hyperemia, due to a decreased outflow). It is beneficial when the cause is not too prolonged or severe. It is such a hyperemia or congestion as may be produced by any other skin irritant, except that it does not come on before six to eight or more hours after the exposure, and remains remarkably long, from two days to four weeks, and in rare cases there may be noted even several months later the extreme vascularity resulting from the hyperemia. This effect of the ultra-violet rays of sunlight is of tremendous importance in the treatment of various abnormal conditions, for through the surface hyperemia so produced we are enabled promptly to reduce visceral

congestion, this reduction not only giving relief from symptoms but reducing their cause as well. This is conspicuously the case in abdominal tuberculosis. Following the hyperemia, a bronzing of the skin develops, particularly with repeated exposures.

Ultra-violet rays have the effect of increasing the hemoglobin of the blood while at the same time making some change in it that enables it to give up its oxygen and carry away carbon dioxide more readily. The rays also increase the number of red and white blood-cells and blood-platelets, and, in fact, the entire quantity of the blood. The power of this revitalized and enlarged blood-stream to destroy or neutralize bacteria within itself is markedly increased, which accounts for the fact that certain disorders, such as boils (not due to diabetes), bone and abdominal tuberculosis, duodenal ulcers and other conditions deep within the body, are corrected more readily by irradiation, or by irradiation associated with diet and other hygienic features, than when there has been no light treatment. These changes in the blood may persist for an astonishingly long time after the cause has ceased. Dr. Donald McCaskey of New York found that patients irradiated monthly or weekly for a period of two years showed a reduction of acidosis and increased power to throw off carbon dioxide, not only during the treatment but also for four years after it had ceased.

The blood is rendered more bactericidal and toxin-destroying, largely through an increase in the number and activity of the leucocytes. When the white blood-cells are not increased by sunlight radiations that produce an erythema, there is indicated either a lowered vitality or an overwhelming amount of toxins. Many people who fail to show an increase of leucocytes at first will show it after receiving radiations for a few weeks.

Blood Changes Through Ultra-violet Rays

One of the more profound changes that take place in the blood under the influence of ultra-violet radiation is a pronounced increase in the calcium content and in the concentration of inorganic phosphorous. It is presumed that this is the result of the greater absorption of these elements from the bowel, that in some manner not understood the blood is enabled to take up from the food in the bowel a larger amount

of these salts when the skin is exposed to ultra-violet rays than when it is not. To make sun-bathing a super-scientific therapeutic procedure and take it out of the individual layman's hands, some medical authorities recommend giving calcium and phosphorus in some form by mouth and then giving controlled irradiations by artificial sunlight in order that the blood may take up these elements. It would seem that such a procedure serves merely to complicate unnecessarily what should be a natural and reasonably simple process, especially when further medication is provided by ductless gland products.

But whether obtained by simple or complicated means, calcium and phosphorus are required in certain amounts, to insure the normal growth and calcification of the skeleton and the integrity of the bone structure. For the purpose of insuring the assimilation of these elements ultra-violet rays have been found much superior to cod-liver oil, though mainly in their greater rapidity of action. Without doubt cod-liver oil has withstood the test of time, and when sunlight or ultra-violet rays cannot be provided, because of climatic, seasonal, or other conditions, cod-liver oil should be given if there is the least suspicion that an infant or child is not being adequately nourished. Even if there is no such suspicion, cod-liver oil should be given regularly, if sunlight in natural or artificial form cannot be provided. There is no possible danger of providing an excess of calcium and phosphorus in organic form; and it is much preferable to err on the side of doing more than is actually necessary to secure normal assimilation of these elements than to expose a child to the risk of not having normally developed bones. One specialist in Berlin, who has had much experience in the treatment of crippled children, many of whom have been rachitic, is of the opinion that whether showing any signs of rickets or not, every child should receive irradiations by ultra-violet rays for at least a month during its first year. If the climatic and seasonal conditions are favorable the same results will be obtained by exposure to the rays of natural sunlight.

Ultra-violet Rays vs. Cod-liver Oil

Whether or not calcium deficiency is the cause, this condition is associated with a reduced capacity for physical and mental work, and increased susceptibility to disease. When

the calcium content is raised, these conditions are favorably altered and there is a feeling of general well-being.

A further effect of calcium increase in the blood is an increase in its coagulability.

Iron and Iodine Increased

Numerous observers have found that sunlight raises the amount of iron in the blood, and either increases the iodine content of the thyroid or renders that present more active. That the hemoglobin is increased has already been mentioned. This is almost equivalent to an increase in iron, since hemoglobin is the iron-conveying element of the blood and iron is, apparently, the most important element in it.

Wound-repair Hastened by Ultra-violet Rays

Whether due to the increase in leucocytes, increased coagulability of the blood, a change in the tissues themselves, or an increase in anti-bodies or of ozone, the repair of wounds is greatly facilitated under the influence of sunlight or ultra-violet rays. In the case of infected wounds there is almost immediate destruction of bacteria. In convalescent centers, during the World War, soldiers with gun-shot and other wounds that were infected or slowly healing were (in some camps) treated with sunlight or actinic rays, and made far more rapid and complete recovery than was possible with Dakin's solution and other medications.

These facts have an important bearing on operations. While such procedures should be resorted to much less frequently than they are, there are numerous conditions and stages of abnormal conditions that require them, and in such cases a course of sunlight treatment prior to the operation is of great value, ensuring quicker recuperation and a lessening of the danger of infection. The surgeon of the future may include heliotherapy or actinotherapy in his preoperation treatment, and doubtless he will find, in many cases, that such treatment will make surgery unnecessary.

Vitamins and Ultra-violet Rays

It was formerly supposed that sunlight or ultra-violet irradiation did not produce any vitamin in the body, but it is now known that such irradiation does increase the *activity* of the vitamins, and perhaps produces vitamin D. Especially does ultra-violet light strengthen the action of vitamin A. These rays also appear to aid the body in storing vitamins to some extent beyond its ordinary capacity to do so.

From the foregoing it is evident that the sunlight exerts

a powerful influence upon the blood; and when we consider that the blood is the "stream of life," that our health is what it is largely in accordance with the nature of this vital stream, we must realize that any influence capable of producing such pronounced and favorable changes in this stream must have a tremendous effect upon the body as a whole, especially upon its metabolism. The changes in the blood produced by sunlight account for the diversity of the conditions improved by it and its seemingly miraculous effects in some cases. The ultra-violet light, at an exposure of from eight to ten inches for one or two hours has been used successfully in cases of pneumonia that had been given up as hopeless by the staff of one of New York's largest hospitals.

Sunlight and the Vital Stream

Closely associated with the effect on the blood is the influence on the endocrine glands. In experiments upon animals it has been found that some of these glands increase in weight after actinic radiations, the increase being due to a growth in the functioning cells—a hyperplasia, not an hypertrophy. The testes showed this hyperplasia, together with other glands. Some people question the applicability of the results of animal experimentation to the problems of human physiology, but no fully informed person can deny that biological truths of great value have been discovered in this way. Whether the endocrine glands of a mature animal can be made to grow for long is doubtful; but that sunlight and actinic radiations do postpone aging and sexual decline, and do aid in bringing back the virility of those who have aged prematurely, is no longer a subject of controversy.

Ultra-violet Action on Endocrine Glands

An effect of sunlight in the relief of pain is sometimes ignored; but while many cases of neuritis or pruritis, or other condition causing or associated with pain, are not relieved by ultra-violet radiation, there are many that are. Deep-seated pains may be as completely or markedly relieved as superficial pains, perhaps partly because of the cutaneous hyperemia produced, as this reduces the congestion about the nerves giving rise to the pain, and partly because of the influence upon the superficial nerves, which are reflexly associated with the deeper structures.

Sunlight and Pain

Upon the nervous system sunlight exerts considerable influence. Over-enthusiastic sun-bathers have experienced

Sunlight and the Nervous System

not only sunburn, but also dizziness, headache, sometimes nausea. These effects may be due to irritation or over-stimulation. "Sunstroke" is an illustration of the powerful influence of sunlight upon the nervous system, yet many cases considered to be sunstroke are in reality heatstroke, an entirely different condition. A heatstroke is due more to external heat and internal heat not normally dissipated, than to the chemical rays, which are the cause of sunstroke proper. A more desirable though remote result of sunlight exposure upon the nervous system is increased mental activity. The mind becomes clearer and more acute, greater concentration and work requiring deeper thought being possible under the influence of the actinic rays. This should not be surprising when we recall the influence of these rays upon the blood, the general metabolism, the vitamins, and the endocrine glands. Those individuals who experience lethargy and mental dullness following sun-baths or ultra-violet irradiations may doubt these claims; but it seems safe to say that their adverse reactions are due to overdoses of the rays. Some authorities are of the opinion that depressing rays are present in sunlight, such as those beyond the near ultra-violet and those of the infra-red yielding considerable heat. But the majority believe that the former are stimulating; and the bulk of the evidence goes to show that when correctly given, according to the individual condition, light-therapy, by means of sunlight or its artificial substitute, always has a tonic effect upon the nervous system and musculature. Dr. McCaskey found that diabetics tolerated ultra-violet light poorly—in direct proportion to the excess of sugar in their blood; but by correcting the diet this intolerance was overcome.

Sunstroke and Heatstroke

Sunlight, Summary of Benefits of

We have covered sufficiently in detail the chief benefits to be derived from ultra-violet radiation or from the ultra-violet rays present in sunshine. Briefly repeated in summary, these benefits are brought about by the following effects of the rays upon the body: pigmentation or tanning of the skin, congestion of an active nature (hyperemia) in the skin and subcutaneous tissues, aiding in overcoming deep-seated congestions, from which many of our diseases originate—in other words, an improvement in circulation; other deep-seated physiological changes which are as yet little understood. A better balance

of various constituents of the blood—hemoglobin, red and white cells, calcium, phosphates, iodine, and iron—is brought about. Arterial tension is lowered, an overworked heart relieved, metabolism heightened, elimination aided, bacteria and toxins lessened and, in many cases, destroyed. The disease of all diseases, toxemia, when not completely relieved, is reduced and kept from developing sufficiently to cause the numerous acidosis disorders. The vitamins are increased in quantity and potency; the endocrine glands are activated; the nervous and muscular systems are improved in capacity for functioning; pain is relieved; the weight is made more nearly normal; and a general feeling of well-being is experienced. And most of these results are from a simple, free source provided by Nature which the majority of people seem to do all in their power to avoid!

Now we come to the rays that are ignored by some authorities as being useless for therapeutic purposes, perhaps even undesirable, the *infra-red rays*. Yet other authorities give to these rays credit for practically all of the good that comes from sunlight baths, considering the ultra-violet rays as being destructive, or to some extent undesirable, and wholly unnecessary. When physicists, chemists, biochemists, physiologists, clinicians and others have learned all they can of the influence of sunlight and its component rays upon human life and health, they will find that the entire solar spectrum is superior to any portion of it.

Infra-red Rays and Health

The infra-red rays have no warmth in themselves. It is only when they are absorbed by some medium, either solid, liquid, or gaseous, that they produce warmth or heat within the medium. This is the form of heat called conversive heat, or, more specifically, radiant heat, in contradistinction to conductive heat, as by means of a hot-water bottle, fomentations, electric heating-pads, and such, and to convective heat, as by hot-air currents. A bullet speeding through the air has no heat within itself; but upon being stopped suddenly by a plate of steel, the motion is converted into heat. This may be called conversive heat, but it is quite different from that produced within an object by stopping and absorbing the "heatless wave" of infra-red rays.

Infra-red Rays and Heat

The fact that these rays are without heat may be demon-

strated easily by merely standing behind a window-glass on a clear cold winter day and noting the "warmth" of the rays of the sun—the warmth that is generated upon absorption of the rays by the body—while the glass remains cold to the touch. *The energy that brings a temperature of a hundred degrees or more in summer passes through many millions of miles of space in which the temperature is far below zero.* Think that fact over. If the sun's energy were merely convective or conductive heat the temperature of the space between the sun and the earth would be raised to the same point as that of the body producing the energy. The degree of heat created by the infra-red rays of sunlight depends upon the degree of opacity of their target, or the degree to which they are absorbed. When the rays reach any object, they either pass through it without change, are reflected (turned back), or absorbed to produce conversive or radiant heat. The nearer to perfect black the object they strike is, the greater the absorption. If the bulb of a thermometer is coated with lampblack these rays will be absorbed to such an extent that the thermometer will record a much higher temperature than it will under the same conditions without the coating, and a temperature elevation will be recorded even when the sunlight reaches the bulb through a thin layer of clear ice. Furthermore, *a concentration of these rays by a lens of clear ice may be sufficient to light a match.* It should not require more striking evidence to prove that radiant heat is the result only of the absorption of the infra-red or "ultra-red" rays, as they are also called, since they are beyond the red rays of the visible spectrum. The name is as fitting as infra-red rays, except for the fact that they are below the red in frequency, *infra* meaning below.

Evidences of Heatless Rays

Effects of Infra-red Rays

The infra-red rays, we found earlier, range in Angstrom units from 7,700 to infinity: the near infra-red from 7,700 to 20,000, the middle or far infra-red from 20,000 to 500,000, and the extreme infra-red from 500,000 to infinity. Some of these rays of extremely long wave-length we do not know how to produce, and we should not know what to do with them therapeutically if we could produce them. But, doubtless, when more is known of them, it will be found that they have properties that will class them, not with the infra-reds as we

now know them, but more with the Hertzian or radio waves. The moderately long wave-lengths will be taken up in the discussion of artificial sunlight and electrotherapy.

The infra-red rays are the rays that penetrate deep into the earth to give life to vegetation. They even penetrate snow and ice and make life possible beneath them. It cannot be gainsaid that the infra-red rays are life-giving rays, and that without them the earth would be a barren waste. It is thought by some scientists, as in the case of the ultra-violet rays, that the sun gives forth some infra-red rays which would be detrimental if they reached the earth, but which are mercifully filtered out by Nature. However this may be, we are concerned here only with the rays that do reach us.

Infra-red Rays Have Penetrating Power

The infra-red rays are absorbed by the cells of the body, but in varying degree, depending upon the depth of penetration, which varies according to the differences in wave-lengths and the nature and conditions of the tissues. At the point of absorption these rays produce heat. This increased heat in the tissues produces a mild hyperemia due to the dilatation of the peripheral blood-vessels, which relieves stasis and therefore is a valuable sedative and decongestant of internal organs. The cutaneous vessels become distended with blood, which must come from the interior, and as they are capable of holding six or seven quarts, about two-thirds of the entire amount of blood in the body, a partial anemia of the brain and other organs—liver, kidneys, spleen, stomach and so forth—is thus created. Because of the cerebral anemia drowsiness develops, often leading to deep slumber. This is a noticeable and characteristic effect of the infra-red rays upon the nervous system.

Infra-red Rays, Value of

If the rays exerted no other influence upon physiology than the generation of heat within the subcutaneous tissues and the resulting dissipation of internal congestion, they would be of great hygienic and prophylactic value. But they are of great therapeutic value as well. Not only is there an increase of circulation in that part of the body irradiated and warmed by them, but the circulation throughout the entire body is stimulated.

The rays also increase the frequency of molecular vibration upon which all life depends. The frequency of these vibra-

tions varies normally in different tissues and is altered in disease, a phenomenon which some regard as a result and some as a cause. However this may be, any influence that restores or aids in restoring this vibration to normal, without having any detrimental effects, will tend to restore health. With the restoration of molecular vibration must necessarily come a return of circulation to more nearly normal. This leads, of course, to more natural cell activity, upon which all healthful functioning depends. By their influence on molecular vibration, therefore, the infra-red rays must have a definitely healing effect.

Influence of Heat upon the Body

It might be argued that heat from any source, such as fomentations, steam, hot air, the hot-water bottle, and the ordinary electric heating-pad, will have these effects, in greater or less degree. It is true that heat from any source will produce a dilation of the peripheral vessel; but such effect of conductive heat is much more superficial than is that of convective heat. Conductive heat does not have the penetrating power of radiant heat. It produces its effect upon the skin and its vessels by heating the skin surface, which then heats the somewhat deeper tissues. As the heat is dissipated by being carried away through the blood, the effect of this penetration is slight. There is no penetration of the heat rays themselves. The infra-red rays penetrate to an appreciable distance before they are stopped, and it is here that, upon their absorption, the heat is generated—*in* the tissues, not *on* them.

Heat has been used for ages for the relief of pain. It often happens that heat from any source is effective in allaying pains of different kinds and intensities. But since congestion and inflammatory conditions are the cause of most pains, and since the effect of infra-red rays upon such conditions is pronounced, and reaches areas more deeply-seated than those which are accessible to conductive heat, their value can be readily appreciated. In neuritis, for instance, radiant heat is of greater value than any other therapeutic measure. The hot-water bag or fomentations can not compare with it in the amount of relief afforded. One means by which thermic rays produce relief from pain is by lessening nervous irritability through its effect upon the temperature nerves. Spasms, as

in muscular cramps and colic, are relieved by the reduced muscular excitability and the increased muscular relaxation produced by the heat. The effects that have been mentioned are not permanent. They may last for only a few hours, and it quite often happens that after they wear off there is a slight aggravation of the original symptoms, due to the natural reaction of the tissues, to chilling of the body surface, or to a combination of these influences. But when the radiations are repeated, and, especially, when other therapeutic agents are employed simultaneously, the symptoms become progressively less upon reaction, and there will be a steady correction of the cause. In the treatment of chronic disorders of this kind radiant heat is of particular value.

The thermic rays of solar radiation cause an elevation of the body temperature. This effect is upon the blood and not the tissues, as is the case in fevers; hence it is a favorable effect. It is a natural stimulant to the heart, brain, and all other organs, and by it the metabolic activity is raised. There is an increased oxidation of proteins, an increased consumption of carbohydrates and hydrocarbons. Sweat-gland activity is stimulated to such an extent that, during a sun-bath, ten to twenty or more times as much sweat may be passed as during the same time under other conditions. This means as much as two or three pounds an hour, whereas the normal amount, without the radiation, is only an ounce or two an hour. Because of the penetration of the thermic rays, moreover, the conditions giving rise to the perspiration are more deeply seated than they ordinarily are, and not only is an increased amount of water eliminated but an increased amount of the other ingredients of normal eliminative sweat. The increased metabolism is also a factor in increasing the specific gravity of the perspiration, which is another way of saying that the solid matter it contains is increased.

Effect upon Body Temperature

Some authorities regard pigmentation as resulting from the action of the ultra-violet rays only, but others find that the infra-red rays also produce this reaction and that the greater its degree the longer will the hyperemia, or increased circulation of the skin, remain.

Ultra-red Rays and Pigmentation

As to the effect of the infra-red rays upon the white blood-cells, authorities differ. Some say that their number is de-

Infra-red Rays and the White Blood Cells

creased, but others say that the contrary may be the case, an increase of 10 per cent. having been noted from daily twenty-minute radiations lasting for seven days. If infra-red rays alone, produced by special lamps, will produce this result, it would seem that those present in sunlight must be a factor in the increase of white cells known to take place under the influence of the complete sun-bath. Gradually more accurate knowledge of this subject is being acquired.

Tidal air, the ebbing and flowing air which enters and leaves the lungs at each respiration, normally approximating one pint, is increased in quantity under the influence of infra-red rays, and the rate of respiration is considerably slowed, indicating much greater depth of breathing. Thus the oxygen requirements of the body are satisfied with less respiratory effort.

Other effects are doubtless produced by infra-red irradiation, such as changes in the blood chemistry and increased growth of some tissues; but the leading known effects have been given.

Infra-red Rays, Summary of Effects of

To review these effects briefly, we find that infra-red rays are absorbed at various depths in the skin and subcutaneous tissues, where arterial, constructive hyperemia is produced by the resultant heat, with results which influence the entire body as well as the tissues directly irradiated. These rays are sedative in effect, in that they reduce nervous excitability and tensions, thus relieving or lessening pain. By increasing metabolism and greatly increasing the reparative and eliminative power of the blood, they are also restorative. They draw blood and lymph from a congested area where a morbid process is going on and scatter the toxic accumulations to some extent throughout the body, but chiefly in the skin. Finally they increase the bactericidal properties of the blood by increasing the number of the leucocytes and reduce respiratory effort by deepening and slowing it, also by sending more blood to the lungs. These effects are sufficient in number and importance to demonstrate the tremendous value of infra-red rays in maintaining health and in the treatment of morbid processes.

Visible Rays, Physiological Effects of

There now remain to be considered the *visible rays*. To these little consideration has been given from the hygienic or therapeutic standpoint, and there seems to be an accord

of opinion as to the neutrality of their relation to physiology and health. Yet it is common knowledge among farmers and stock-raisers that animals thrive better in well-lighted buildings than in dark ones. In tenements and other places where daylight is deficient, children thrive poorly and develop serious physical disorders. The lack of sufficient ultra-violet rays may be a factor in these developments, but since the visible rays are associated in nature with the invisible rays, one would expect them to have some favorable influence upon health and growth.

The visible spectrum has been found to contain 5 per cent. of blue rays and 80 per cent. of yellow and green ones, with 15 per cent. divided among the other four colors, especially the red. These rays have been proved to have considerable skin-penetrating power, having been registered at from two-fifths of an inch to two and two-fifths inches below the skin surface. The yellow rays penetrate farther than the blue, passing through muscle-tissue, which blue will not penetrate. It is believed that the red rays have an even greater penetrating power. These rays, together with the orange and yellow, will affect a photographic plate after passing through various tissues, such as those of the hand, far more quickly than will the blue, violet and ultra-violet rays. Even an ordinary low-candle-power incandescent electric bulb, with its rays properly reflected, will affect a photographic plate after passing through some tissues, such as those of the cheek, within a few seconds, while a mercury-vapor light, which is rich in actinic rays, will not produce the same effect even in five minutes. At least the red portion of the visible spectrum has some power to produce heat within the tissues upon absorption, even though this will be considerably less than the heat produced by the infra-red rays. But some other subtle change in the tissues, the blood, the glands, or nerves may be produced by various rays of the luminous spectrum.

Composition of Visible Spectrum

The infra-red rays are dark rays, invisible; but in nature and by most artificial means they are associated with luminous rays. Ultra-violet rays also are invisible, but, in nature and always when produced artificially, they also are associated with the luminous rays. It is possible to obtain these latter without actinic rays, or with an insignificant proportion of

them, but all means which produce luminous rays also produce heat waves to a greater or less extent. However, most of the heat produced by artificial means is convective rather than conversive. That is, few infra-red rays are present in the ordinary lamps which produce luminous rays, and this small amount of infra-reds is insignificant and much overbalanced by the convective heat waves, which are not penetrative. Hence any penetration of the body under the influence of light must be by the luminous rays. The beneficial influence of high-powered incandescent light bulbs, for instance, is considered not to be due so much to the light rays as to the heat (convective heat).

Penetrability of Light Rays

The general opinion in regard to light, held by the majority of investigators, is that, while "light is a food" supplying some subtle energizing element or elements required by the chemistry of the blood and nervous system and that while "light is the only source of life," it is not really the "light" as we know it, that is of such vast importance to health and vitality and in the correction of abnormal states of health, but the rays that come to us unobserved. However, there is no doubt that everyone should have as much "light" as is possible, especially if his health is below normal, taking along with the visible rays whatever else they bring with them. Since sunlight has had such tremendous influence upon the origin and maintenance of life and health upon our planet, and since disease, sickness, weakness, and deformity are produced when the sunlight is denied, it behooves us to spread the gospel of "More Light," in order that the waning health of the human race in civilized countries and communities may be brought back to the natural state. Glass is now being manufactured which does not filter out or absorb the actinic rays. This can be substituted for the ordinary window glass which does absorb these rays.

The Unseen "Light"

So much has been said of the value and importance of sunlight that the average person may be impatient to begin the sun treatment of some abnormal physical condition, to improve his already good health, or to provide his body with all possible protection against disease. Unfortunately, there are handicaps which make it not altogether easy to secure sunbaths that are as beneficial as has been intimated.

Sun-baths, Inconvenience of

The more civilized we have become the more inclined we have been to look upon the human body as something too vulgar and lewd to be exposed. Consequently, in order to obtain a sun-bath in the nude (the only manner in which it is of full value, except when local treatment is desired), one must find some secret place beyond the reach of human eye. This is very difficult in our modern communities, and it is in the larger communities or cities, especially, where the dearth of sunlight is felt most and where sun-baths are most needed.

Sun-baths, Smoke and Dust as Handicaps to

Except where suitable ordinances have been passed relative to abatement of smoke, our large centers of habitation usually shut out a large proportion of the ultra-violet rays. Soft coal being less expensive than anthracite or hard coal, it is used extensively in manufacturing, in residences, apartment and office buildings, and upon the railroads, filling the atmosphere of the cities and forming a ray-filtering film over a large section of the surrounding country. In winter, and almost to the same extent in spring and autumn, these communities have a greatly reduced amount of ultra-violet rays, a condition which is responsible for much of the disease prevalent at these seasons. Even in summer the amount of actinic rays is greatly below that which is actually given off by the sun.

Rays More Plentiful at High Altitudes

The large amount of dust carried far above the atmospheric layer in which men dwell and the clouds, fog, mist, and haze that spread between us and the sun also absorb a large portion of the actinic rays and thus permit even many rural districts to receive little more of them than is received by the smoke-screened manufacturing city. At the seashore there usually is a fair proportion of them, but even here the clouds and haze reduce them appreciably. In summer the proportion of the rays is far above that of the other seasons. That we receive enough of them in most localities, especially at the seashore, in the mountains and on the shores of our lakes, is shown by the rapidity and intensity with which solar erythema and sunburn are produced when the light-starved body is exposed to the sunlight.

It is only at considerable elevations above sea-level that practically the entire amount of ultra-violet rays given off by the sun is received. Altitudes of five to eight thousand feet

are usually above the clouds, and there is practically no trace of dust or smoke in the atmosphere. Dr. Rollier's clinics at Leysin in the Swiss Alps, are at altitudes of 4900, 5300, and 5900 feet. He has declared his belief that it is the combination of unhindered ultra-violet rays and the stimulating cold atmosphere that is responsible for the remarkable results he has secured in the treatment of tuberculosis, there being few days throughout the year on which the sun does not shine with extreme clearness.

Enough Rays for Health if Available

However, it is impracticable for most people to go to these heights. Many who most require the benefits of ultra-violet irradiation could not endure such altitudes even if they could get to them. However, while the red and white blood-cells, the hemoglobin and the chemical efficiency of the blood and tissues increase in proportion to the elevation above sea-level, they are increased sufficiently at any altitude, if the atmosphere is reasonably clear, and some heliotherapists have been able to secure most gratifying results at a level only slightly above sea-level.

Physiotherapists who employ artificial sunlight in the treatment of disease are often inclined to make their branch of healing something "super-scientific." Some of them claim that the sunlight provides none too much of the actinic rays at best, that the intensity of these and of the heat rays is never constant, that, in brief, constancy of dosage is impossible and hence accuracy of prescription out of the question. All this is granted. However, for innumerable years the world has not required science to give it sunlight, nor to separate the rays or intensify them by artificial means. Life on the planet has survived because it received enough of these rays to maintain life and health. What is needed now from science is not so much help in the application of the rays as help in removing the conditions that prevent them from reaching us. Considering the handicaps of ray-reflecting and ray-absorbing clothing and of habitations that shut out the ultra-violet rays and often much of the visible light as well, it is surprising that human health has remained as good as it has, and our common sense will tell us that if we get *all* the sunlight there is even part of the time, *in direct contact with the body,* a vast improvement in the public health must take place, and many of

Sunlight "Dosage," Problem of

our common ailments, and uncommon ailments as well, will disappear into the darkness whence they came.

Let it not be supposed, however, that all there is to the sun-cure is to place in the sun a person suffering from some disorder known to be curable by sunlight and just leave him there to bake; or that all there is to "helio-hygiene" is doffing all clothes and lying in the sunlight until roasted to a crackling, or taking a sun-bath today and another a week or a month from today, as if one could store up sufficient of the rays to carry one through the intervening days. Neither is heliotherapy or helio-hygiene merely sitting in the open air while fully equipped with outdoor apparel, perhaps with hat and parasol, or seated in the shade of a tree or building. There is much more to heliotherapy and to helio-hygiene than that. It may be mentioned here that helio-hygiene is a term coined by Dr. C. W. Saleeby for the use of sunlight in the maintenance of health and the prevention of disease, whereas heliotherapy refers to the use of sunlight in the treatment of disease. Anyone, physician or lay person, will admit that *prevention of disease* is far more valuable than treatment. An ounce of prevention is worth a ton of cure in some diseases.

Sun-bathing Not Merely Lying in Sunlight

Heliotherapy and Helio-hygiene

Sunlight being so absolutely natural, it is difficult to make sun-bathing scientific, but some physicians have done so, with benefit to their patients. Perhaps none has made the sun-bath more scientific than Dr. Rollier, and it seems quite certain that none has had the marvelous results from heliotherapy that he has had. But it is not necessary to be so very scientific to use sunlight, either for the maintenance or improvement of health or for the correction of disease. It is largely because the skin of the average person is so sun-starved, so blanched, so "hide-bound" or inadequate in function, so defective in response to stimuli, that there is need of special care when beginning sunlight treatment. This care, therefore, would not be so necessary, usually would not be necessary at all, if our bodies were exposed to sunlight frequently, thereby maintaining a good degree of pigmentation and of health. Because this has not been done, caution at first must be observed, the degree depending upon several factors. In fact, Dr. Rollier holds firmly to the belief that sunlight treatment requires a greater degree of individualization and adaptation to different cases

Sunlight Treatment, Precautions in

than any other therapeutic method, and it is the "make-up" of the individual and the peculiarities of his health and health disturbances that makes the individual adaptation of importance.

It goes without saying that sun-baths, in health or disease, must be taken while the body is divested of all clothing *if the very best results are to be obtained.* When several persons of the same sex are sun-bathing at the same time the demands of modesty may be satisfied by very light and scanty clothing. Men may use jock-bands, narrow loin-cloths or small trunks, or even a small towel passed between the thighs and attached corner to corner at the waist. When possible to avoid them, it is better not to wear even these small garments, especially if there is any abnormality of the sexual system; for, while general irradiations with the sexual organs covered will benefit the sexual system, when these organs receive the light rays directly the beneficial results are more prompt and more decided.

Clothing if Worn Must Be of Light Color

If for any reason it is necessary to wear clothing it should be very openly woven and of light color, and should cover no more of the body than absolutely necessary. White or light-colored garments, of suitable texture, will permit considerable of the beneficial rays to reach even the covered portions of the body. Light tan and gray will be almost as satisfactory as white, and so will yellow; but orange and red and such dark colors as blue and black will exclude them. The lighter colors reflect much of the heat rays while the thin gauze texture permits the actinic rays to pass. On the other hand the darker colors keep practically all the latter from the body. By absorbing the heat rays these garments become very uncomfortable in bright sunlight.

It is advisable for one to have the head covered during the early sun-baths, or until the body is well bronzed. Even then if the irradiations are taken during the heat of the day when the sunlight is intense the head should be protected. This protection may be afforded by means of a light-weight hat with a wide brim if the bather is up and about, or by means of some suitable sunshade if he is reclining. When the rays are intense, or when there is any special weakness or sensitiveness of the eyes, the eyes should be protected by dark or yel-

low glasses or some special glasses or goggles such as are used when taking a bath under ultra-violet-ray lamps.

There are two distinctly different methods of accustoming the blanched and sun-starved body to the sunlight without danger of harmful results. One of these was originated and is used by Dr. Rollier in his clinics at Leysin, and consists in progression in the amount of body surface exposed as well as in duration of exposure. The other, more generally used, consists in merely increasing the duration of the exposure. It should be very clearly understood that only a rough outline can be given, for many variations will be necessary, in accordance not only with the general health but also with the nature, extent and location of any diseased condition present.

Sun-baths, Rollier's Methods of Exposure

In Dr. Rollier's method there are three irradiations in succession, repeated at intervals of ten minutes. The first day's applications are to the feet only, each of the three being of five minutes' duration. On the second day the feet are irradiated for five minutes, and the legs up to the knees are included for the next five minutes. On the third day the feet receive the light for five minutes, the legs up to knees for a second five, and the thighs to the hips for the third. On the fourth day the fourth five minutes include the region up to the navel, and on the fifth day the fifth period of five minutes includes the chest. This for the front of the body. The back is treated similarly and by the end of two weeks the entire body is exposed for from two to four hours daily, sometimes for as much as six hours. Prolonged irradiations to the entire body are not given until the pigmentation has become complete, and this may take a longer or shorter time than has been indicated above.

Dr. Rollier considers it advisable to start first with the feet, which may be called a "neutral part of the body," because no general serious reaction will be produced by irradiations here, and the individual's degree of tolerance can be learned from the reaction. When this system of progression is employed the "smothered, blanched and blinded" skin becomes gradually accustomed to the actinic rays, and the entire body at the same time develops the power to respond favorably to them.

Sun-baths, Progression Required in Irradiation

Sun-baths for Tubercular Subjects

It must be understood that Dr. Rollier's clientele consists of tuberculous subjects, both children and adults. In these cases it is more important that the body be adjusted most carefully to the sun rays than in many other abnormal conditions and in normal or average health. In addition to this precaution, Dr. Rollier insists that during the period of examination the patient remain in bed. Considering the altitude of the Leysin clinics it is evident that the patients will have to adjust themselves to a rarified atmosphere, which is trying to many people in good health if there be any exertion. After a few days, or perhaps a week, during which time the various general symptoms due to the elevation are reducing until they finally disappear, more air is gradually admitted into the room, and eventually the patient is wheeled onto an air balcony, receiving no sunlight, where he remains for a short time. Soon he is able to spend the entire day on the balcony. After from one to two weeks he is able to proceed with the sun-cure which has been described above.

Sun-baths, Entire Body Exposures in

The other method of taking the sun-baths is less tedious. It can be used by the average person in good health and by many in ill health if reasonable caution is observed. This method consists in exposing the entire body at once, except for the head, but beginning with short exposures and increasing their duration. In a very hot Summer sun the first exposure should not be over ten minutes, divided equally between the front and the back of the body with the bather reclining. If there are no unpleasant reactions from this first insolation the duration of exposures may increase five minutes daily. For the majority this will be a safe plan. Feeble persons should make their first bath shorter than mentioned, perhaps from three to five minutes being ample, with a three-minute increase daily. Those with light hair and blue eyes (blondes) have thin and sensitive skins, but the first method of five-minute increases of general irradiations usually will be perfectly safe for them. Brunettes and those with naturally dark skin may be able to make their first sun-bath of ten or fifteen minutes' duration and increase ten or fifteen minutes daily. It is very important that those desirous of taking sun-baths for physical benefit avoid overenthusiasm and haste unless they are certain of their ability to withstand reasonably long exposures. Ex-

cept in some skin diseases, nothing is to be gained by sunburns or more than moderate erythema.

Sun-baths Effects of Over-exposure

Exposures beyond the healthful point, which naturally will vary in different cases, are apt to produce headache, lassitude, insomnia and depression, perhaps nausea. Feeble persons or those with sensitive skin are very likely to develop these symptoms from undue exposure. Severe sunburn may be associated with fever and prostration in addition to the extremely painful skin condition. If one can so gage the exposure as to produce a mild hyperemia, the tanning process will be shortened appreciably, and the health improvement from the sun-baths will be more rapid and more pronounced.

Sun-baths, Protecting the Head

Whether using the above method or Dr. Rollier's, the head should be protected, which may be done by means of a broad-brimmed hat of light weight, by a parasol or some dark cloth, especially after placing a cold wet towel on the head. A napkin or cheesecloth may be wrung from water at 60 to 65 degrees F., and applied to the face, or the face and neck, in addition to the head protection, especially by feeble individuals or in very hot sun. A good protection, also, is wetting the hair and scalp. But if the hair is wet, or a wet cloth applied, the wetting should be repeated after each five minutes until the body has become accustomed to the sun, when this or other protection may be dispensed with, except in the case of feeble and very sensitive patients. Very unpleasant symptoms may follow even comparatively short irradiations in some sensitive individuals without head protection.

Erythema, Four Degrees of

There are *four degrees of erythema* that may be produced by sunlight, also by artificial sunlight by the carbon-arc or mercury-vapor lamp, especially the latter. These are: *First-degree erythema,* being a slight reaction with delicate pinkness of the skin noticeable in a good light, with no subjective symptoms and no visible scaling. This degree permits daily treatments. *Second-degree erythema,* definite reddening of the skin readily noticed at a glance after reaction has occurred, with mild subjective symptoms and granular scaling or exfoliation within a few days. There may be daily or alternate daily treatment. *Third-degree erythema,* an intense reaction with marked dermatitis and inflammation of the subcutaneous tissues, pronounced reddening, with the skin peeling in large

strips and fairly pronounced subjective symptoms. Further sun-bathing should be postponed until the skin has again become somewhat normal. *Fourth-degree erythema,* blister formation. The reaction becomes apparent within a comparatively short time after the exposure, sometimes within an hour, but usually within from three to five hours. There are often severely pronounced general subjective symptoms, with nausea and perhaps vomiting, headache, loss of appetite, general malaise, fever. There should be a delay of ten days before sun-bathing is resumed.

The first two degrees may be called stimulative erythema, the third a regenerative erythema. All these are stimulating and bactericidal, while the third, because of the congested state of the capillaries, provides a greater capacity for regeneration. This is the most useful actinic reaction and the one generally sought by actinotherapists. The fourth degree may be called a destructive erythema; but whether caused by natural or artificial sunlight it never results in scar formation. The general symptoms, if the area involved is considerable, may be extremely severe, and much more harm than good may result from it. But when it is localized, as is often the case with artificial sunlight, the general symptoms are more or less insignificant. This degree is often purposely produced in actinotherapy for the more speedy correction of certain abnormal skin conditions, also in the treatment of severe and intractable neuritis, neuralgia, sciatica, lumbago, and other nerve and muscle affections.

Stimulative and Regenerative Erythema

In case sunburn develops it is not necessary to discontinue the sun-baths, unless the condition is extreme, with general symptoms. In succeeding sun-baths, however, it is important that the sunburned area or areas be protected against further damage by some dark fabric until the inflammation, swelling and pain have appreciably subsided or disappeared. Cold wet cloths should be placed over the sunburned areas several times daily, without further protection, so that by evaporation the parts will be cooled. This is very soothing.

Sunburn and Sun-baths

If necessary or advisable to use a substitute for cold water, a little dry starch, powdered boric acid, or zinc ointment may, if desired, be placed over the areas, and kept in place with gauze, but usually this will not be necessary. If the sun-

burn is extreme, it should be cared for like an ordinary burn. Cracked ice compresses aid most promptly in neutralizing the great local heat formed in the sunburned tissue.

To receive the greatest benefit from sun-baths it is best to take them daily, increasing the exposures as rapidly as is safe until their duration is from one-half to one hour. Several hours may be spent daily in the sunlight after the skin and the body generally have been prepared. The greater the pigmentation, the longer the exposures required for results, but these longer baths may be taken without harm. Some people with naturally white skins become as dark as half-caste Hindoos or South Sea Islanders. This is considered objectionable by some women, who prefer the blanched, marble-like skin of the sun-starved to the bronze of the open-air devotee and the vigorous health that goes with it. But the public attitude has improved in this respect, and tan is now positively fashionable.

Sun-baths, Regularity and Duration of

Many people complain of lassitude following the sun-bath when there are no other symptoms. Those who prescribe artificial sunlight are inclined to disapprove sun-baths for this reason, claiming that they are naturally enervating. It cannot be denied that they have this effect in many instances but usually it is because they have been continued too long, or, especially, that they have not been terminated properly. The depressing effect is due to an acute acidosis which the chemicals of the blood soon neutralize. This can best be counteracted by some cooling, tonic application. If one can take a cool shower immediately after the sun-bath, there will be a pronounced feeling of invigoration, and some such tonic water application should follow every sun-bath. Among other measures that may be used are the shower bath, the cool douche, the wet-hand rub, the wet-sheet rub, the splash bath, wet-towel rub, or a cool plunge and swim.

One should know something of the influences governing the intensity of the sun's rays, and the influences governing the duration of the sun-bath and its effect upon the body. In the north temperate latitudes the rays are most intense during the three months of summer—from the middle of June to the middle of September. During spring the strength of the rays gradually increases as summer is approached, and in the

Influences Governing Sun-ray Intensity

autumn diminishes. In the latitude of New York in winter, an effective sun-bath cannot be taken except at considerable altitude, and even then an exposure of hours is required. In the south temperate latitudes effective sun-baths are possible in spring and autumn, and in the torrid zone the year round.

When the atmosphere is clear, without fog, haze, or smoke, the rays are much more effective than otherwise. Winds do not directly affect the intensity of the rays, but if very strong or cool they may make the procedure unpleasant, especially for sensitive people. Occasionally it is only when the wind blows that the atmosphere is sufficiently clear for sun-baths to be effective to an appreciable degree. In the clear, rare atmosphere of elevated regions (approaching or above a mile) the sun's rays are so intense that effects are obtained in one-half the time required at sea-level. But at the beach, reflection from the water, especially with the water between the bather on the beach and the sun at the south, intensifies the effect of the rays, thus shortening the time required for good effects.

Preventing Disagreeable Reactions

A certain degree of benefit will be obtained from being in the open air in the shade of trees or buildings. One cannot, however, obtain a sun-bath under such conditions, nor on an open but shaded porch, nor in a glass-enclosed porch in the sunlight, unless the glass be of the special type made to allow the entrance of the actinic rays. Under a very light-colored, open-weave umbrella or parasol some benefit from the light rays will be obtainable if the body is unclothed. The combination of even the most suitable clothing with such a sunshade will, however, prevent so many of the rays from reaching the body that the benefits will be negligible, except, perhaps, in very intense sunlight with a perfectly clear atmosphere. When bathing on the beach better results will be obtained by alternating sun-baths with short plunges and swims in the water, provided, of course, neither the sun-baths nor the water applications are repeated too often or continued too long.

In the case of very old or prematurely aged people, those with skins bleached completely by perpetual overclothing and lack of exposure to sunlight and even to the air, individuals with very light-colored skins and very pale complexions, those

suffering from certain disease conditions, such as diabetes, and young children, short exposures are generally indicated and, as it has been called, the "drop-bottle" method or "creeping" sun cure—very small doses to the lower extremities for some time and gradual inclusion of the entire body. Hardy young and middle-aged persons and those with naturally dark skins, conversely, can start with longer exposures and increase them more rapidly with perfect safety.

Compromise Sun-baths

The sun-bath and the sand-bath make an excellent combination. The sand being warmed by the sun, the entire body is warmed at the same time, by the sand below and the sunlight above. Sweating is induced more quickly than by the sun-bath alone. This is an excellent treatment for the general health, and is especially useful for the chronic affections termed rheumatism. In the latter case, however, it is advisable not to follow the sun-bath with a cold plunge or any other cold application, but with a tepid sponge, followed by wrapping lightly in a sheet, with gradual cooling off. Inflamed joints, after drying, should be wrapped in cotton or wool, and then covered with some impervious material, the patient, of course, being removed into the shade.

Sun-baths in the Sand

Before perspiration develops in the sun-bath there necessarily is a period of superheating. This causes an elevation of the temperature, which may amount to from half a degree to two degrees. When the perspiration "breaks," and especially when it begins to form beads and to trickle down the body, the temperature is reduced. But there are some who do not perspire easily. Diabetics, chronic dyspeptics whose skins are dry and lifeless, persons with severe anemia, especially chlorosis, and those with certain forms of what is termed a rheumatic tendency, are often slow to perspire and are thus especially liable to overheating. If these persons drink water abundantly during the sun-bath, perspiration will be increased, and by repeated sun-baths, properly conducted, normal perspiration will gradually be restored. Those who perspire easily need have little fear of becoming overheated during sun-baths.

The Superheating Period During Sun-baths

The indications for the sun-bath cover a wide range of general and local disorders, in addition to its usefulness as a general hygienic or prophylactic factor of first importance.

Sun-bath, Various Uses of

In fact, the contraindications are very few, as will be seen later. In all metabolic disorders, especially when there is reduced or defective oxidation, the sun-bath is particularly beneficial. In this class of disorders are obesity, rheumatism, and the uric-acid diathesis. All anemias, including primary and secondary, promise a good field for sun-bathing, since it improves the quality of the blood and aids in the elimination of toxins. It helps to correct the tendency to spasm of the cutaneous vessels, with resulting internal congestion. Hemophilia is said to respond favorably to it, and circulatory defects are also benefited. Nervous disorders, including various forms and degrees of neurasthenia, headache, sciatica, and some forms of paralysis are corrected or improved. Defective alimentation or nutrition is greatly benefited, especially in children, but also in the malnourished adult. The bony systems seems particularly responsive to sun-baths, as has been shown by the successful treatment of a wide range of bone affections, chief among them being rickets, osteomalacia, and tuberculosis. The end of rickets seems in sight now, since it has been proved to be one of the "diseases of darkness," and hygiene. Respiratory affections, including tuberculosis and pleurisy, are very favorably influenced by sunlight. Surgical adhesions are often lessened in number, sometimes almost disappearing, and pelvic disorders of men and women improve. Sunlight is one of the greatest rejuvenants known, having a favorable influence upon the glands of sex as well as upon all other tissues affected by the aging process—which, of course, means every tissue in the body. Muscular affections, including lumbago and strains, quickly yield to sunlight. Without any exercise at all the patients of Dr. Rollier show wonderful improvement in muscular tone and volume, developing muscles of surprising size and firmness.

Sunlight and Rickets

Sunlight as a Rejuvenant

Numerous skin affections are corrected or greatly improved by the sun-cure. Among these may be mentioned acne of all kinds, alopecia, especially alopecia areata, boils, furunculosis and carbuncles, chilblains, most forms of dermatitis, including x-ray dermatitis, scars, acute and chronic eczema, herpes of any part of the body, hives, impetigo, lupus, psoriasis, pruritis, ulcers of any kind, and wounds. All traumatic injuries, including lacerations, fractures, gun-shot wounds and all infected

Sunlight for Skin Affections

wounds heal more rapidly under the influence of sunlight than with any other treatment.

Sunlight and Tuberculosis

Dr. Rollier and others have proved the tremendous value and importance of sunlight in the treatment of tuberculosis anywhere in the body. Successfully responding to this treatment are not only tuberculosis of the lungs, but of the spine, hip, knee; foot, shoulder, elbow, hand, pelvis structures, lymphatic glands, skin and mucous membrane, kidney and epididymis, together with tuberculous sinuses and peritonitis. Among other conditions for which sunlight should be employed are varicose ulcers, burns, and septic abscesses, including felons; while in convalescence from practically any disease, a return to normal or usual health is greatly hastened by sun-baths.

Naturally the sun-bath cannot be employed in all these cases in the same manner nor in the same dosage. Very great care and technical skill are necessary in many of them; others are more easily handled. In some, such as wounds, ulcers, and bone diseases, local irradiation alone may be sufficient to effect a cure; but even in these cases, more rapid progress will be made if the local treatment is supplemented by exposure of the entire body to the sun's rays.

What are the contraindications to the use of the sun-bath? It would seem from the above enumeration of disorders favorably influenced by sunlight that there can be few contraindications, and such is the case.

Individualized Application of Sun-bath Necessary in Diabetes

Authorities claim that diabetes is a contraindication, that not only manifest diabetes and excess sugar in the blood, but latent conditions of a similar nature make the sun-bath undesirable. Others consider properly conducted sun-bathing, with corrected dietary, very beneficial in these cases. It is largely a matter of individual peculiarities, and, since heliotherapy is of decided value in some of these cases, and since it cannot be foretold what cases will respond favorably, it is best to try it before any real damage is done. Indications will arise to show whether or not the bath is suited to the patient, and it is worth while running the slight risk of mildly undesirable developments for the greater benefit that may result from the treatment.

During the mild fever that occasionally develops in chronic

tuberculosis of the lungs, it is best to avoid sun-baths altogether. In cases of fever the temperature-regulating mechanism of the body is disturbed and it is easy to induce an increase in temperature. Pulmonary tuberculosis in its acute form, with even a very slight febrile condition, is a positive contraindication to the sun-bath; and in those cases in which no fever develops, it must be used with extreme caution, even though practically all should receive it. The cases of pulmonary tuberculosis most benefited are those in which the disease is localized—in which there is a single "focus." Progress is less satisfactory when there are "multiple foci," and with more or less regular or decided increase or fall in temperature, and in hemorrhages.

Those Who Especially Need Graduated Sun-baths

Cases of insomnia require much care in the application of the sun-bath, because of the danger of overheating the head and overstimulating the nervous system. In these cases the duration of the bath should be very gradually increased, and, as a rule, the head should be very well protected; also, the cold application following should be very moderate at first, but may terminate with a ten or fifteen-minute douche, spray, or affusion to the legs and feet at a lower temperature than that used for the general application. The temperature of the latter may be gradually reduced from day to day. If these precautions are observed, sun-baths will be beneficial in such cases.

Gout May Not Be a Contra-indication

Some authorities believe that, since sun-baths raise the calcium content of the blood and since this condition already exists in gout, gout is a contraindication to the use of sunlight as a therapeutic agent. This opinion is not unanimous, and too few cases of genuine gout are met with these days for physicians to know definitely what the influence of sunlight would be. If the baths were given with much caution but persistently, they would, no doubt, be very helpful; but in such conditions considerable care must be taken not to give very cold or very prolonged cool applications after the bath. The water at first should be between 75 and 85 degrees, and should be applied for only twenty to sixty seconds; then from day to day the temperature should be gradually lowered until it is from 65 to 60 degrees. If the cold or cool water is applied directly to the affected joints, the pain will be in-

creased; hence this should be avoided. The tepid sponge, shower, fan douche, or broken horizontal jet will be the most suitable form of application in these cases.

Advanced circulatory diseases, especially uncompensated valvular disease or myocarditis, are said to respond poorly to or to be affected unfavorably by sun-baths. However, if very short exposures are given at first and the "creeping" sun-cure employed with caution, also if the tonic applications following be very moderate, benefit may result. A cold-towel or wet-sheet rub lasting for from ten to twenty seconds, with water at 60 degrees, or above, will not be detrimental.

Circulatory Diseases

Some heliotherapists will not permit sun-baths during menstruation, claiming that the reduced bactericidal power of the blood at this time is further reduced by sunlight. Others have given them under these conditions, often at the request of the patients themselves, with no unfavorable results. Many women feel the bracing influence of sunlight more keenly at this period than at other times. If the treatment is given with judgment, nothing but good should result from it.

Menstruatio

Tuberculosis of both kidneys, with impending uremia, is a contraindication. This is a comparatively rare condition, however, and as the patient is certain to be under the care of a physician, it need not be considered in mapping out a program for self-use.

While sun-baths are of great value in skin eruptions, the after-treatment must be carefully adapted to suit the case. Friction is to be avoided, of course, and the finishing tonic application should be mild, say a prolonged shower-bath at a temperature of from 85 to 78 degrees or a tepid bath at 90 to 85 degrees, for from two to five minutes. To bring about reaction after the bath, exercise is much better in these cases than friction.

As a general rule, one should avoid sun-baths, or modify either the after-treatment or the manner in which they are taken if they are followed by depression instead of by exhilaration. If there remains any erythema from the previous sun-bath, it may be better to postpone the next treatment until this has disappeared. If the skin is scaling or peeling from previous sun-baths one should either wait until the desquamation is completed, or remove the dead scales by friction with

Sun-baths and Skin Eruptions

hand, towel, or flesh-brush, for these scales absorb the ultra-violet rays and prevent them from reaching the live skin where they are needed.

Among the many other conditions which are benefited by sun baths are boils, carbuncle, catarrh, ozena, colds, general debility, dandruff, also in felon, goiter, hip-disease, incontinence of urine, infantile paralysis, insanity, jaundice, suppurating joints, locomotor ataxia, malaria, masturbation, plethora, psoriasis, purpura, ring-worm, scrofula, seminal losses, shingles, Pott's disease, sterility, syphilis, cretinism, sleeping sickness, leucorrhea, whooping-cough, rheumatism, arthritis deformans, balanitis and barber's itch.

Having learned how to take the sun-bath and when not to take it, the question is: When and where shall we take it? As for the time of day, there is some difference of opinion. Some heliotherapists claim that, during the hot season, the sun-bath should be taken only during the early and late hours of the day. When the sun is intensely bright and hot, they say, the actinic and heat rays are too powerful and are liable to produce depression. Those who hold this view, however, are much in the minority, and even they prescribe sun-baths, during the cooler season, in the middle of the day, when there is a larger proportion of both the actinic and the heat rays in sunlight.

When to Sun-bathe

Rollier claims that for best results there should not be too much of the heat rays, which are depressing and fatiguing. In fact, he prefers relatively cool surroundings, and recommends taking the sun-bath in summer between six and nine A. M. and after three P. M. The morning, however, he considers better than the afternoon. The trouble in lowlands during the summer, in many sections at least, is that there is no relatively cool time of the day for days at a time. Certainly one *should not wait for such a time to begin sun-baths*, or halt treatment when a hot and sultry period comes. If the intense heat in the middle of the day is avoided, or if, when this is the only time available, the exposures are short, nothing but good should result from the irradiations, if other factors are favorable. Rollier says that sun-baths taken with the temperature in the shade up to 64 degrees, may be called sun-baths, while those taken with a temperature higher than this

should be called hot-air baths. But by whatever name they are called, they would be sun-baths, nevertheless, and very effective ones if not overdone.

When the early morning hours of summer are used for the general sun-bath, additional local irradiations, for superficial lesions and wounds, may be given between eleven and twelve, providing the sunning is of short duration and interrupted frequently. In short, it seems only common sense that, whether general or local baths be given, the sunning be regulated, in duration and extent of surface covered, according to the intensity of the sunlight and the nearness of the hour to noon or the hottest part of the day. In autumn and spring, in temperate latitudes, the middle of the day will be the only time during which effective sun-baths can be taken without very long exposures; and during these seasons the effectiveness of the sunlight will be even further reduced in proportion to the time distance from the middle of summer. In high altitudes at this season there may be enough of the actinic rays in the sunlight so that, by exposures for an entire morning or afternoon, very beneficial sun-baths can be secured.

Regulating the Sun-bath to Sun's Intensity

The weaker the individual, the more pronounced an abnormal condition, the greater the susceptibility to diseases of the blood-vessels; and the fairer, the paler, or the more lifeless the skin, the greater will be the need, at first, for short sun-baths.

As to where the sun-bath may be taken, this sometimes proves to be quite a problem. People in rural districts should have little if any difficulty in finding an isolated place where prying eyes are absent. The back-yard is an excellent place in towns and parts of cities where there are no tall buildings. A portable canvas screen may be placed about a cot, a mattress or blanket on the ground, thus giving privacy and comfort. If one can have a sand-pile at this place, the sun-bath may be combined with a sand-bath, with greater enjoyment and somewhat better results. In one case, a farmer took his sun-baths through the window of his hay-loft, while lying on gunny sacks on the hay; another went into the woods, and another into the tall weeds behind the barn. There are many places about the farm, or in thinly settled rural districts, where one can secure a sun-bath in privacy.

Sun-bath, Where to Take

Sun-bathing in the Home

But even in such districts, it is often necessary for the sun-bath to be taken through a window of the residence. If the top sash of the window is lowered completely and the curtain and shade removed, one may secure a thoroughly beneficial sun-bath while reclining on the floor, or on a cot or bed. In an apartment building having windows of other apartments opposite, the lower half of the window may be curtained. If this does not afford sufficient protection, a cheese-cloth or mosquito-netting curtain may be placed over the open part or the whole window; or half the body may be irradiated at a time; or very light-weight, porous material, either white or light-colored, may be laid over the body itself. Nothing should be worn if it is possible to avoid it, but there are times when compromise is necessary.

Beach Sun-bathing

Those who have access to a beach may take part of their sun-baths there. Here it will be necessary to wear the bathing-suit, which is usually made of materials and of colors that prevent practically all the actinic rays from reaching the covered parts of the body. But sun-baths so taken will be better than none at all. Those who have private beaches can easily provide facilities for taking the sun-bath nude, perhaps by boarding up a suitable enclosure. Such an enclosure may also be made in the back-yard by people owning or even leasing property in towns, and by farmers. It should be provided with air space below all or part of the walls, or should have a shutter-like window on each side.

Outdoor Solarium

The outdoor solarium will be more valuable if some facility is provided for the cold or cool water application, which should be taken immediately after the sun-bath, or, during prolonged baths, every ten or fifteen minutes. One may, of course, go indoors for the cool bath, but the inconvenience of doing so may lead to carelessness in regard to this important part of the treatment. A suitable piping with a shower-head and faucet arranged in the enclosure is an excellent provision. A sitz bathtub may also be provided, if desired. If these arrangements are not possible, one may have a basin or tub of water, for a splash, sponge, or towel bath.

Indoors it is easy to protect the head by simply lying so that it is in the shade of the window-casing and wall. Outdoors it may be necessary to use a hat or a parasol. In the

enclosures one may lie with the head in the shade of a wall, or a projection may be built or canvas stretched outward from the south wall for use during the time when the sun is fairly well overhead.

Many people bask in the warmth of the sunlight as it comes through ordinary window-glass, wrongly thinking they are getting sun-baths. They are getting light and heat baths; but they are not getting sun-baths, for ordinary window-glass will not permit passage of the ultra-violet rays. A room may be flooded with light, or broiling under direct sunlight, as in a solarium or hothouse, yet have none of the life-giving actinic rays. Physicians used to prescribe for patients exposures to the light of the sun through windows, and for a long time the observing ones wondered why those so exposed did not progress as well as those who were exposed directly to the sunlight in the open air. Even with plenty of fresh air provided, patients will not make much progress under these conditions, nor will sunlight received through ordinary window-glass give immunity to diseases known to be preventable by sunlight. Hence, the discovery of certain methods of treating glass and some other transparent substances so that most of the actinic rays will pass through is one of the most vital and important that has been made by modern science.

No Sun-baths Through Ordinary Window Glass

During the past very few years several makes of glass and glass-substitutes pervious to ultra-violet rays have been placed upon the market. The value of this discovery is twofold. It aids those in health resorts and curative institutions of various kinds to get well more quickly, and it is of tremendous value to those who are not ill, helping them to gain more health and energy than would otherwise be possible. Already some hospitals and sanitaria have provided some of their rooms, particularly their solaria, with glass that lets in the life-giving actinic rays. Farmers, stock-raisers, and chicken-raisers have used some of the glass-substitutes instead of ordinary glass for the buildings in which animals are housed, and have healthier stock, with greater production of milk and eggs, than under the old conditions. Even the reflected sunlight through such glass has proved to be of greater value than direct sunlight through ordinary window-glass. Factories and schools are now putting in window-panes of the new materials, with

Glass and Glass Substitutes Pervious to Ultra-violet Rays

marked benefit to the occupants. Within a comparatively short time, let us hope modern dwellings and all other buildings in which people are housed will be provided with windows permeable to the ultra-violet rays. No more useful application of helio-hygiene and heliotherapy could be made.

If one must take sun-baths indoors and cannot take them through open windows as has been suggested, one should secure a glass that is permeable to the actinic rays. The present disadvantage of such a form of improved glass is that it is expensive. But even so, it would not cost a great deal to equip one or two windows with it. However, some glass-substitutes are very inexpensive and almost as good. In fact they even have a certain advantage over the glass in that they are not transparent. They let in the light, but cannot be seen through; hence they insure complete privacy. A sun-porch, or a portion of it, may be provided with such a glass-substitute; or a window-frame might be fitted with it, to be slipped into the window and secured by means of cleats or slight tacking, after the window has been opened as widely as possible. A still further advantage of the glass-substitute, especially one with wire mesh coated with a semi-transparent substance, is that it lets in more heat than either ordinary glass or the special glass; yet it is very tough and resistant to even severe rain and hailstorms. The glass and glass-substitutes that permit the ultra-violet rays to pass through them are procurable through builders, lumber-dealers, and dealers in glass and hardware.

Glass Substitutes for Home Sun-baths

It has been proved that everyone needs sunlight. Everyone needs not only light, or heat, or the ultra-violet rays, but all of these, every portion of the sunlight; and there should be few conditions in life making it impossible to get enough sunlight to maintain health, reduce susceptibility to disease, make ordinarily serious illnesses less severe, and promote recovery from them. A person who understands the advantages of sunlight, and still continues to starve his skin and blood for lack of it, is entitled to little sympathy for the ailments he develops and the greater rapidity of the aging processes within his body.

Sunlight, Universal Need of

Now as to the sun-bath for children. Children naturally grow into adults if they maintain life at all. But all do not

develop alike. Even discounting inherited and individual differences and varying diets, children develop differently. One of the most important of all influences upon their development is sunlight. A child who receives an abundance of sunlight from infancy through the growing period, or even for the first few years of life, is vastly different from a child who lives in darkness, even if every other factor is the same in the two cases. The latter will develop certain physical weaknesses from which he can never completely recover. As was pointed out earlier, the various mineral elements and vitamins present in food are made more available by sunlight; and as children are growing and have cells greedy for every element required in the makeup of the body, the influence of sunlight starvation is greater in childhood and infancy than in adult life.

Children and Sun-bathing

The bones of children show, perhaps, more than any other part of their bodies, the influence of a deficiency or an abundance of sunlight. While the teeth are not, strictly speaking, bones, they share the same loss or gain. The effect of sunlight upon the calcium and phosphorus content of the blood, and the relationship between an assimilable supply of these minerals and the bony system have been noted. But it is in childhood that the bones make the most pronounced growth, and it is during this time that denial of the elements of growth causes the greatest derangement. The report of an experiment to demonstrate or ascertain the value of sunlight upon growing children will prove interesting and instructive.

A well-known school in England had the windows of one of its classrooms fitted with one of the new glasses permitting passage of the ultra-violet rays. In this room thirty boys between nine and eleven years of age conducted their regular school work for ten months. In another classroom not provided with such glass was a "control" group of boys, practically identical as to age and physical condition. During the ten months the average gain in weight of the "control" boys was 2.83 pounds, in height 1.22 inches, and in hemoglobin 7.53 per cent. But the boys in the experimental room made an average gain of 6.11 pounds in weight, 1.86 inches in height, and 16.14 per cent. in hemoglobin. This means that the class in the health-glass room gained 4.28 pounds, .64 inch

Ultra-violet Rays, Test

in height, and 8.60 per cent. in hemoglobin *more* than the control class in the same ten months, with all other circumstances practically identical.

Effect on Children of Sunlight

If we need further proof, all that is necessary is an observation of the differences in stature and appearance of the boys and girls of the plain and mountain sections of the country and those of cities, especially the cities that have many manufactories with a heavy film of smoke hovering overhead and filling the atmosphere at the breathing plane. Note the hardihood of the boys and girls of our northwestern rural districts, where a combination of bright sunlight in summer and cool or cold nights and winters is the rule and the more or less dwarfed and stunted figures of the city-dwelling children. Compare even the city children having access to the parks and those of the slums and tenement districts, and the comparative influence of sunlight and darkness will be apparent. Delicate children, who are "born tired and never get over it," need sunlight more than any other single health factor except proper food.

By careful scientific experiment it has been proved that, when all other factors are conducive to rickets, the disease will not develop if sunlight is provided, even in comparatively small doses. So active are the rays of sunlight that general sun-baths every second day will correct rachitic changes. Furthermore, if both wrists, for instance, are affected with rickets, and one of these be excluded from the sunlight during the sun-bath, the unexposed as well as the irradiated wrist will be restored to normal. Artificial sunlight has also been proved to be capable of preventing and curing rickets, and even such sunlight as reaches the inhabitants of a city like New York has a prophylactic and curative influence.

Sunlight for the Pregnant Woman

The pregnant woman who desires to give her developing child the best possible body, and at the same time save her own tissues and health, will do much toward realizing these ends by taking sun-baths during pregnancy. Still better results will be secured if these sun-baths are begun months before conception. Many women give up to their developing children the calcium, as well as other elements, from their own bones. "For every child a tooth," is an old saying, and some women lose more than one tooth for every child they bear,

because of the demand of Nature for building material for the child. A perfect diet will do much to preserve a pregnant woman's tissues from this drain; but a less perfect diet, provided it is not markedly deficient in any element or elements, will serve the purpose if she secures plenty of sunlight directly upon her body. The best plan, of course, would be to have the best possible diet, plus sunlight. Sunlight and diet are not the only factors necessary for ensuring the health of a pregnant or nursing woman and her child, but no other factors surpass these in importance.

In giving sun-baths to children and infants, much care must necessarily be taken to avoid overexposure. Their skins are delicate and easily affected by the ultra-violet rays—even more so than the sun-starved skin of adults—and there are, besides, great differences between them. Some possess the elements that permit them to bronze quickly and become protected against overdosage, while others have these elements in such small amounts that caution must be observed for a much longer time. As to the duration of the first sun-baths, much depends upon the time of the year and the time of day, the atmospheric conditions and other factors. But during the summer, when the sunlight is quite intense at mid-day, it is much safer to give the sun-baths before ten A. M. or after three P. M., with an exposure of not more than five minutes. The exposures may increase in length from three to five minutes daily, depending upon the complexion of the child and other natural and individual factors easily determined. Much will depend, of course, upon the reaction secured as to the duration of succeeding exposures. If erythema of more than the first or second degree develops, succeeding exposures must be shorter, or there should be a rest from the treatment. After tanning has begun, the exposures may be increased somewhat more rapidly, but, except with older children and those with an abundance of natural pigment, as revealed by their dark skins, hair, and eyes, there should be less rapid increase at any time than with most adults. With all children the head should be protected, and, in the case of infants, it is much safer to keep the head entirely out of the sunlight, as by having it behind some opaque object, which may be the body of the mother or nurse.

Care in Sun-bathing Children

Terminating Tonic Bath for Children

The cool or cold wet-hand rub is the best tonic application to use for children after the sun-bath, though the sponge or wet-towel rub may also be used, especially with older children. After the age of adolescence has begun, practically any tonic application suitable for adults may be used, provided it is not made too severe or of too long duration and care is taken to insure prompt and complete reaction, which will not be difficult when effective sun-baths can be taken.

When to Give Sun-baths to Children

If one would have "children of quality," children with superb little bodies, with the greatest possible resistance to disease, with sturdy bones and strong beautiful teeth that resist decay, with alert minds and abundance of energy, they should have plenty of sun during the growing period. For at least one or two months every year, if it is impossible to continue them through the whole season in which exposure to sunlight is effective, a child should have sun-baths daily, or at least every other day, while the mother should be subjected to the same beneficial influence before conception and through the periods of pregnancy and lactation. If every mother and every child received a "course" of sun-baths yearly for a few years, the health of the human species would be vastly improved within a single generation, and within a few generations we would have a race of surprising stature, hardihood and resistance to disease.

The Sun-bath Habit

SUN TREATMENT BY ARTIFICIAL MEANS

Section 5

DURING the past comparatively few years countless experiments have been made in the attempt to produce apparatus for giving off portions of the solar spectrum. The first lamps or appliances were very crude; but gradually more effective apparatus has been produced, until, at the present time, there are numerous appliances for yielding ultra-violet and infra-red rays in large quantities. Infra-red rays are among those given forth by the sun, as we learned earlier. But it is to the ultra-violet rays that the term *artificial sunlight* is applied, and it is to these rays that we shall give our attention at present.

Artificial Sunlight and Ultra-violet Rays

Treatment of disease by means of ultra-violet rays from special lamps is called *actinotherapy* or *phototherapy*. These terms are also used to denote treatment by the rays of radium or other radioactive body, by the x-ray, and often by the sun's rays as well. Included in phototherapy is also treatment by very powerful incandescent lamps, giving great heat but little or no ultra-violet rays; these are often called "deep-therapy" lamps.

The effects of ultra-violet rays upon the body have been described and need not be repeated here. These effects are the same whether produced by the actinic rays of sunlight or by those of a lamp, provided the ultra-violet spectrum of the latter is the same as that of the sun. But in the solar spectrum are only the longer ultra-violet rays (those of the near ultra-violet portion of the spectrum), with perhaps a small portion of the longer of the far ultra-violet rays. The shortest wave-length ever found in the ultra-violet rays of sunlight is 2910 Angstrom units. We have already found that smoke, dust, moisture, altitude, and geographical location, as well as window-glass, modify the proportion of these rays reaching the earth, as well as their intensity and penetration, thus making it impossible to determine exactly the desirable length of ex-

Artificial Sunlight and Natural Sunlight

posure to them. Some of the sun-lamps, on the other hand, yield ultra-violet rays of all wave-lengths up to 1849 Angstrom units (which carries through the near and far and into the extreme ultra-violet section of the spectrum), and they are produced at such close range to the body that no intervening filters interfere with their reaching it.

Ultra-violet Rays

There are two distinctly different types of lamps now widely used for supplying ultra-violet rays for therapeutic purposes. One is called the mercury-vapor lamp, or the quartz mercury-arc lamp. The other is the carbon-arc lamp. In either case the rays are produced by an arc formed by an electric current passing between two terminals. In addition to the invisible ultra-violet rays, visible rays and heat rays are also produced. The heat is so great that the parts of the lamps become extremely hot, so if they are brought too close to the patient a severe burn may result. Some people imagine that this effect is produced by the ultra-violet rays, but it is not different from any other heat burn and might be produced by an incandescent body yielding no ultra-violet rays.

Mercury-Arc Lamps

MERCURY-ARC LAMPS.—There are two distinct models of these lamps, one for general use and the other for local and orificial (cavity) use. The burner in either model is a quartz tube containing mercury in a vacuum. In "lighting" the lamp it is slightly tipped, after turning on the electricity, so that the mercury enclosed in the quartz burner lightly hits the tungsten target. When contact is made, the current flows through the mercury and soon a brilliant arc flashes forth. It is from this arc that the ultra-violet rays are given off. The quartz burner, while having the appearance of ordinary glass, is like it only in its transparency, for it permits transmission of ultra-violet rays of all wave-lengths up to the comparatively short ones of 1849 Angstrom units. It is for this reason that quartz is used, glass being opaque to all but the ultra-violet rays of longest wave-length, which are not considered to be of the greatest health-preserving or curative value. Another reason for using quartz glass is its high melting-point, which is about twice that of ordinary glass. The heat generated in these lamps is considerably above that required to melt ordinary glass, but considerably below that necessary to melt or fuse quartz.

Treatment with Air-cooled Mercury-Arc

The *air-cooled mercury-arc lamp* is for general irradiations. The burner is in a reflector of fairly large size that concentrates the rays in the direction of the opening of the reflector, thence upon the body of the person being irradiated. The burner of this lamp, though becoming very hot to the touch, is kept from becoming too hot for its own safety by direct radiation, hence the simple designation, air-cooled lamp.



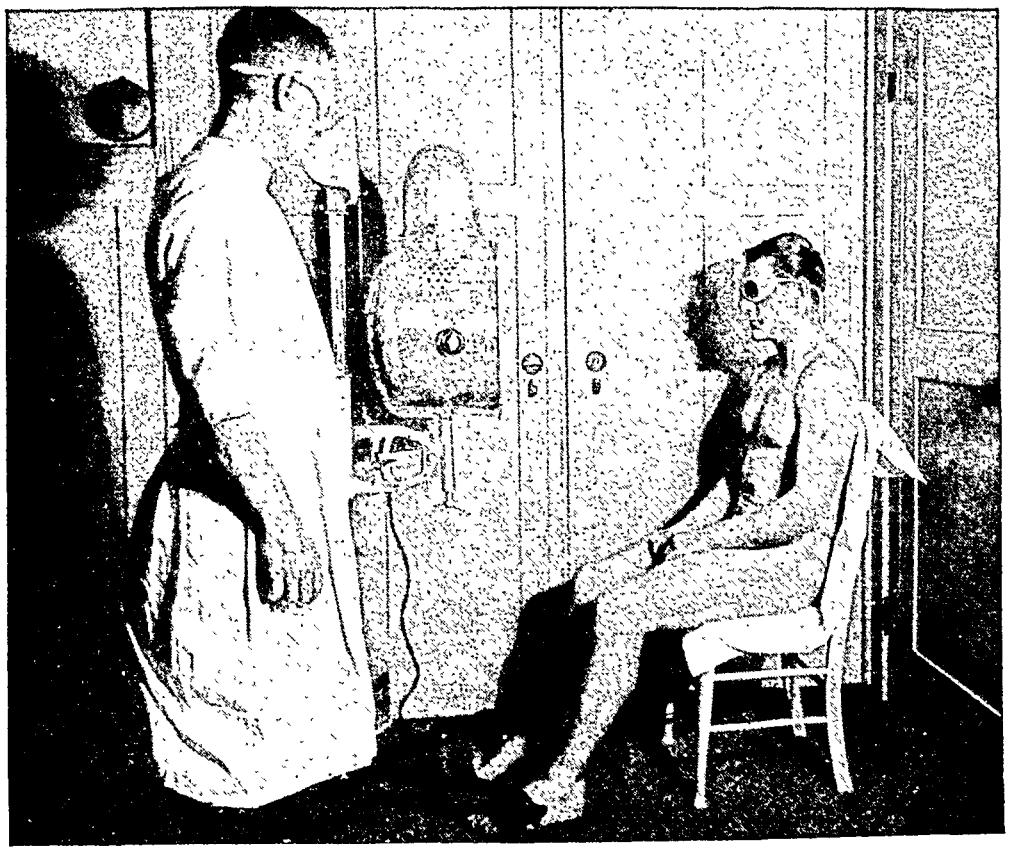
The air-cooled mercury-arc lamp, shown above, is for general irradiation. A stimulating or a sedative effect may be produced, determined by the distance between the lamp and the body. The illustration shows one of the modern types of this form of lamp.

In treatment with this lamp, of whatever make, provided it is an effective producer of ultra-violet rays, care should be taken not to have the body too close to it nor to continue the exposure too long. Better results are always obtained when some degree

by means of special quartz transmitters, or compressors. The water comes through rubber tubing attached to a cold-water faucet, and, after circulation, leaves the lamp through a similar tubing by which it is conveyed to a basin or elsewhere. The irradiations are usually given by means of quartz transmitters, the cooling of the lamp in the manner described permitting direct contact with the skin without burning, although sunburn ensues as after exposure to the sun.

Direct Contact Light Treatments

The lamp is designed, in fact, for such direct contact and is of special value in the treatment of local skin diseases and defects, such as eczema, acne, lupus, birth-marks, ringworm, and ulcers; nose, throat, and ear disorders; bladder, prostate, and female pelvic disorders; tuberculous sinuses, pyorrhea and other dental troubles. Numerous focal disorders that will make extremely slow progress, or no progress whatever, on other treatment will respond to its irradiations. It is not,



Taking an artificial sun bath by means of a carbon-arc lamp. The eyes must be protected from the lamp's rays. For localized pains and specific disorders, only the affected parts need to be exposed, though general irradiations hasten improvement.

however, a lamp for home use. It should be used only by those specially qualified by training and experience under proper guidance, and hence will not be further discussed here.

CARBON-ARC LAMPS.—The carbon-arc lamp was the first lamp devised to yield ultra-violet rays for therapeutic purposes. The light is produced by a pair of carbons so adjusted that, when an electric current is turned on, an arc is formed between them which burns with an intensely bright light until the carbons have been consumed or until the switch is thrown. There usually is a self-regulating mechanism which permits the carbons to "feed" as they are burned.

Local Treatments, Carbon-Arc Lamps

According to the United States Bureau of Standards, the therapeutic carbon-arc lamps produce more ultra-violet rays than do the mercury-vapor lamps. There is a difference also in the character of the rays, those from the carbon-arc ranging from 2000 Angstrom units up to 14,000, which includes some of the ultra-violet rays (from 2000 to 3900 A.U. being in the ultra-violet region), all the visible spectrum, and from 7700 to 14,000 in the infra-red region. Hence, by means of this lamp, one receives not only the rays presented in sunlight, but still shorter ultra-violet rays than the sun yields—from 2000 to 2910 Angstrom units. But the mercury-vapor lamp yields still shorter rays than the carbon-arc lamps—from 1849 Angstrom units upward. As these are the more stimulating rays, it will be seen that greater stimulation can be produced by the mercury-vapor lamp than by the carbon-arc lamp. As it is the longer of the ultra-violet rays that produce pigmentation, one will tan more quickly under the carbon-arc lamp than under the mercury-vapor; and, when sedative and tonic treatment is desired, it will be just as satisfactory as the latter, perhaps somewhat more so. One may be somewhat closer to the carbon-arc lamp than to the mercury-vapor during treatment for tonic effect, but, even with this lamp, the closer it is to the body the more stimulating will its rays be.

Superiority of Carbon-Arc Lamps

Different carbons have been produced for different therapeutic effects. That is, the carbon cores have been specially treated with different metals which, upon burning, produce different combinations of rays. These carbons all look alike and all are used in the same manner in the lamp. But if the lamp is to be used at home, it is not advisable to experiment

Different Carbons for Different Effects

with different carbons. Some manufacturers of lamps do not have them, but depend upon a single kind which, if it is properly made, closely approximates sunlight in its rays.

Treatment by Carbon-Arc Lamps

In beginning treatment with the carbon-arc lamp, the exposure should usually be from five to ten minutes, with the patient placed about 30 inches from the lamp. Much depends, of course, upon the kind of lamp, and upon the patient's complexion and natural resistance or susceptibility to the ultra-violet rays. These lamps yield a greater degree of heat than the mercury-vapor lamp, but not sufficient to prevent one's getting close enough for rather severe skin reactions. Because of the fairly large volume of ultra-violet rays, even though these are not the very short stimulating rays, one can secure a pronounced (even final-degree) erythema if exposures are too long or at too short a distance before the body has had a chance to provide a protective layer of pigment. It is better to start with five minutes exposure at, say 30 or 36 inches from the lamp (from the arc itself, not from the edge of the reflector), and increase dosage two minutes daily until pigmentation has developed sufficiently to permit exposures of from 30 to 60 minutes, but 30 to 40 minutes is usually ample for any single exposure. Sometimes exposures are given to the front of the body one day and to the back the next day. The body may also be divided into zones, the anterior three being radiated one day and the posterior three the next in the manner already described under *Mercury-Arc Lamps*. For general prophylactic or hygienic purposes, this anterior-posterior alternation is perfectly satisfactory.

Duration of Exposures to Lamp's Rays

Tungsten-Arc Lamps

TUNGSTEN-ARC LAMPS are often used in England and some other European countries, but the claims made for them vary so that it is difficult to determine just what might be expected of them. Some authorities claim that, while they are very rich in ultra-violet rays, these rays are the longer ones and hence similar to those of the carbon-arc lamp. Others who have used them say that the wave-lengths extend from about 180 to 2000 Angstrom units when only tungsten electrodes are used—in these lamps it being possible also to use one tungsten electrode opposing carbon, or two carbon electrodes, as well as opposing tungsten electrodes. If such extremely short rays, comprising most of the extreme ultra-vio-

let, are given forth from the tungsten arc, it would seem that this would be the arc to employ for pronounced stimulating effect, and that it would have a decided advantage over even the mercury-vapor rays, the shortest of which are 1849 Angstrom units. Greater care would be necessary in using it, however, for the reason that the rays must be vastly more irritating than those of any other artificial "sunlight" or of natural sunlight. But the fact that this lamp is very little used in this country indicates that others have been found superior to it. It is more than doubtful that such extremely short rays as are credited to it (180 to 1500 Angstrom units, at any rate) are produced by the tungsten arc. Certainly such short rays are not produced with electrodes only part tungsten.

A precaution that one always must observe when using any sun-lamp is to protect the eyes of both patient and operator. An agonizing conjunctivitis can be produced quite easily, within a very short time, by the ultra-violet rays from any of these lamps, and even when one remains entirely out of the direct line of the radiation, such an inflammation may be produced by reflection, especially if sheets or other material be used to cover part of the patient's body. While this inflammation is not actually dangerous, it is extremely painful and, if it receives no treatment, may completely incapacitate one for as much as one, two, or three days. It may be relieved, however, with a drop of castor oil in each eye and with ice compresses.

Precautions in the Use of Sun-lamps

All lamp-makers provide dark glasses or goggles with their lamps. The former may be used if one is facing the light, as when giving radiations to children. But in most cases the goggles are better. These are glasses surrounded with metal, leather, or colored glass, which exclude all ultra-violet rays from the eye. To protect the eyes of the patient a folded cloth may be used. This is the better method of protection for children and the only sure method for infants.

Eye-protection Necessary

Many people believe that the so-called "violet-ray" outfits so commonly sold produce ultra-violet rays. There are even some physicians who do not know the difference between real ultra-violet rays and the violet-colored ray produced by these toys. There is absolutely no comparison between these rays, and it is doubtful if the slightest benefit is derived from the ordinary cheap "violet-ray" apparatus.

"Violet-ray" Outfits

Cost of Lamps

Mercury-vapor lamps are not inexpensive in cost, operating expense, and upkeep. All mercury lamps use quartz burners, the water-cooled lamps use quartz applicators, and quartz is very costly. The best carbon-arc lamps also are expensive, both in original cost and in operation. However, there are some small, comparatively inexpensive lamps using the carbon-arc, usually so small as to be ineffective for general irradiations, except by the zoning method. A great many homes have these lamps, and in many they are employed regularly during the seasons when natural sunlight baths cannot be secured. In a smaller number of homes there are to be found mercury-vapor lamps, usually placed upon the advice of a physician, who has supervised treatment.

Sun-lamps for Family Use

But whether the carbon-arc or the mercury-vapor lamp is used, it would be advisable for practically every home to have an apparatus whereby "sun-baths" can be procured without awaiting fair weather and a favorable season. The rays of these lamps will have as good an effect as similar rays present in sunlight, and if the precautions given above and those provided with any lamp purchased are taken, especially if the advice and perhaps the observation of a physician are secured, there need be absolutely no harmful or undesirable results from their use.

Uses for Artificial Sunlight

All the diseases and abnormal states and the many gradations of ill-health that are specifically benefited by ultra-violet radiation cannot be enumerated; but a partial listing of these will show the wide application of this therapy. Among the disorders in which ultra-violet rays may be considered specific (but better when combined with other physical measures, in most cases) are: rickets; the spasmophilic diathesis (tendency to spasms or tetany); surgical tuberculosis, formerly so-called—bony, glandular, intestinal, peritoneal; numerous skin diseases, including acne, alopecia (baldness), eczema, epithelioma, erysipelas, favus, herpes, impetigo, keratosis (overgrowth of the horny layer of the skin), lichen, lupus, nevus or birthmark, pruritus ani and pruritus vulvae, psoriasis, sycosis (fungus-like skin disease), ulcers, and warts; secondary anemia; burns; and pyorrhea. Ultra-violet therapy is a valuable accessory treatment in various gastro-intestinal affections—autotoxemia, bile-tract diseases, constipation, gastric

ulcer, and mucous colitis; in affections of the nose, throat and ear, such as hay-fever, inflammation of the middle ear, ozena (foul odor in chronic rhinitis), and sinus infection; in women's disorders, including amenorrhea, cervicitis, dysmenorrhea, leucorrhea, and vaginitis; in specific men's diseases, such as bubo, chancroid, and gonorrhea; in rectal disorders, such as fistula, hemorrhoids, and pruritis ani; and in osteomyelitis (inflammation of the bone-marrow). Its use is to be recommended, with prospects of better results with whatever other treatment is being employed, in numerous other conditions, such as asthma, chilblains, "fatigue habit," or generalized and constant fatigue, goiter, heart irregularities, hypertrophied tonsils, hypertension, kidney-disease, pulmonary tuberculosis, rheumatism, toxemias, and wounds.

General irradiations will be necessary in some of these affections, while in numerous others localized treatment will be required, as by the water-cooled mercury-arc lamp, especially in some of the skin affections and affections of the nose, throat and ear, and of the female generative tract. The experienced physician, of course, will know which modality to employ; and the individual desiring to use a lamp in his home will readily rule out some of the above conditions as unsuitable for home treatment.

General and Local Application

INFRA-RED THERAPY.—Earlier in this discussion it was noted that the infra-red rays are at the end of the visible spectrum opposite the ultra-violet, and that they are longer than the visible rays while the ultra-violet are shorter.

It was noted, also, that the infra-red rays are the "heat" rays; but this term is very misleading, since these rays possess no heat in themselves, and are quite different from heat transmitted directly from one object to another. The infra-red rays produce heat only in objects which absorb them. They travel from the sun through millions of miles of atmosphere far below zero temperature, to warm the earth and its inhabitants and to make life possible upon the earth.

Infra-red Therapy and Heat

Waves of such energy are emitted in some degree by any element or substance that possesses what we call heat, their vibrations increasing as the temperature of the source increases. This energy has, for ages, been employed for the relief of pain, congestion, inflammation, and other abnormal

Methods of Producing Heat

conditions. The value of heat for such purposes has been known, perhaps, since heat was discovered; but, until comparatively recent years conductive heat has been used for the most part—heat applied by direct contact, as by the hot-water bottle, hot cloths (compresses or fomentations), the hot bath, and such. These applications bring relief by producing hyperemia of the cutaneous tissues, with some withdrawal of blood from interior regions, and the same result is produced by substances which irritate the skin—liniments, ointments, plasters, and poultices. That these have served an excellent purpose is shown by the fact that they have withstood the progress of time and are still employed, perhaps even more today than ever before. Yet these means of producing heat are uncleanly, cumbersome, and unscientific, even though prescribed by men with medical diplomas.

Heat in Abnormal Conditions

Any heat supplied by direct contact has little penetration power, and most mediums for supplying such heat begin to lose it as soon as applied through absorption by the body and the atmosphere. Hence, their greatest heat is at the time of application, and within a comparatively short time they reach the temperature of the body. To be effective it is necessary that they be renewed frequently, which is usually inconvenient, besides being, often, very disturbing to the patient, often increasing pain by the necessary moving, or disturbing sleep. Lamps and other means of providing convective heat—especially infra-red rays—make all this unnecessary. But, before further discussing these appliances, let us briefly review the effects of infra-red rays upon the body.

Of the sun's total output of energy it is found that eighty per cent. consists of infra-red rays or heat energy. Certainly, when such a large percentage of the energy of this great life-creating and life-sustaining body is of this kind, we must conclude that it is of extreme importance to life and health. Whenever sick and wounded animals can do so, they place themselves where they can secure as much sunlight and sun *heat* as possible, except, perhaps, when the mid-summer sun is shining. By doing so they recover with comparative rapidity. Humans, who may know nothing whatever of ultra-violet and infra-red rays, or of the curative effect of these rays, likewise turn instinctively to sunlight and sun warmth, or to artificial

Most of Sun's Energy in Infra-red Rays

warmth, when indisposed or ill, although other influences may, at times, lead them to do otherwise.

The nature of infra-red rays is to produce heat where they are absorbed. If they were absorbed directly in the superficial layers of the skin, they would have no greater effect upon the body than any conductive-heat generator. But if you recall the wave-length variance of the infra-red rays—from 7,700 Angstrom units to "infinity" (or 2,000,000 Angstrom units, as some state)—you will realize that there must be a considerable variance in their penetrating power. The fact is that some penetrate the tissues to a considerable depth before they are absorbed, which makes them superior to any form of conductive heat. However, claims are often made for them by manufacturers and salesmen of the generators which cannot be lived up to, for the simple reason that it is beyond the power of infra-red rays to produce such effects.

Penetrating Power of Infra-red Rays

The most obvious effect of treatment with infra-red rays is pronounced hyperemia. Hyperemia means an increased circulation of blood in any part and is quite different from congestion. The latter condition is due either to too much arterial blood reaching a part for the amount of drainage supplied by the veins (active congestion), or failure of the veins to carry off a normal amount of blood (passive congestion); but in hyperemia there is no stagnation, both arteries and veins are conveying more blood than normally, but with the arterial supply (usually) over-balancing the venous drainage. At least hyperemia induced by the application of heat is of this nature, though the abnormal amount of blood in a part during some pathological condition is often referred to either as hyperemia or congestion, either of which may be active or passive. See the precautionary procedure mentioned later in the last paragraph under *Local Light-Baths*.

Hyperemia—Principal Effect Infra-red Rays

The hyperemia induced by any convective means, such as infra-red rays, is analgesic—pain-reducing. It is also relaxing, the spasms and tensions resulting from the pain and congestion of a diseased part being reduced. It is decongestive, to a beneficial extent, through its effect upon the skin vessels, which secure some of their blood from congested organs or tissues within. These may be called the local effects of treatment by such heat. It also has general effects, such as a seda-

Value of Infra-red Irradiations

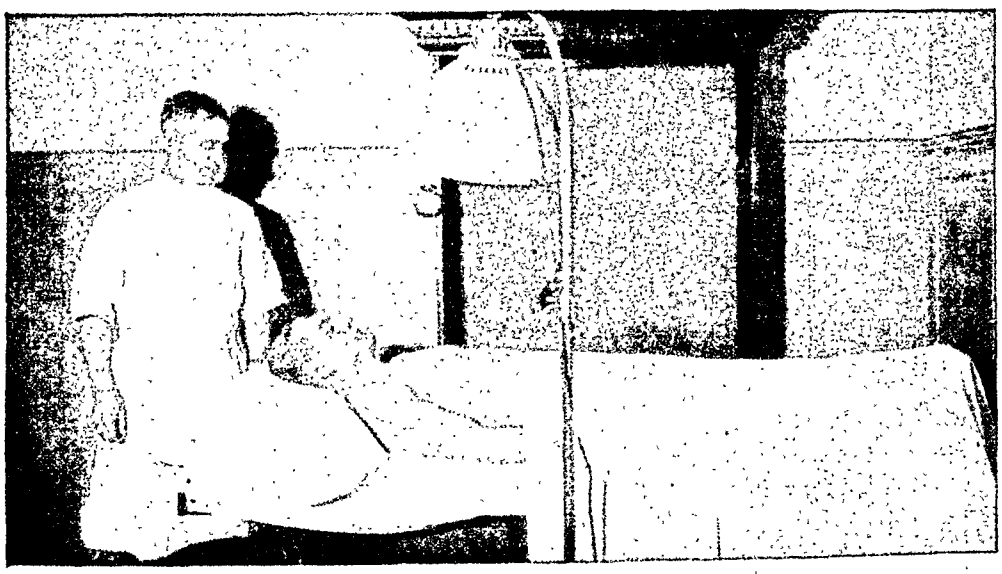
tive and soothing action; a restorative and eliminative action through the markedly increased blood supply to the part treated, which hastens repair; and a derivative action, through calling blood from congested regions or by bringing it to anemic regions.

Relieving Pain and Removing Causes

Thus there are numerous conditions in which the infra-red rays may be used with great benefit, and some rather superficial conditions in which the trouble may be completely relieved by them. But when the area to be treated is deep within the tissues, conversive heat, in what is known as *diathermia*, briefly discussed under *Electrotherapy*, is much to be preferred. But diathermia as a therapeutic factor belongs strictly to the physician, and the necessary apparatus is so expensive as to be prohibitive for use in the average home. The appliances for home use are those for producing radiant light and heat, and these do much that cannot well be done by any other home treatment. They will even, in some conditions, take the place of diathermic treatment till such can be secured.

Local Treatment or Symptom Treatment

Many people, however, do much to assuage or remove pain and other unpleasant conditions, not infrequently with disastrous or serious consequences. Pain is a most important danger signal. It never comes without adequate cause, and that cause is some condition which tends to progress if not removed. To the physician the pain directs the search for its



Treating with a radiant light and heat lamp. This lamp gives off powerful light and heat rays, producing a temporary hyperemia, thus increasing the flow of blood and nutriment to the part treated.

cause—for the real trouble. To many people pain *is* the trouble, the *only* trouble. If they can stop the pain, they think that they escape the trouble. Radiant light and heat, or some other home treatment, will often relieve pain or other distressing symptoms sufficiently to give the patient a dangerous feeling of security; he believes that the trouble has been removed or greatly reduced. With an occasional fleeting pain, or with some pains that occur chronically in some of the superficial tissues, no great harm may result from treatment directed to the pain itself. But even here, and certainly in the case of numerous internal pains, the pathological condition creating the pain may be allowed to progress during the treatment of this one symptom until a stage develops which cannot be corrected.

It is not meant to give the impression that one should run to a physician with every pain that develops, or every other symptom. This entire set of volumes has been carefully prepared to help the layman to overcome abnormal conditions that might otherwise necessitate the calling of a doctor. But they are also intended to discourage the almost universal tendency to strike at individual symptoms without taking into consideration the more important underlying conditions. The fact is that the entire body suffers when any part of it suffers, and any symptom must of necessity concern, to some extent, some other part than the one in which it apparently originates, or to which it may be confined. Even though the symptoms may be treated with benefit in many instances, the *entire body* must be treated if permanent results are to be secured, and if pathological conditions are to be prevented from progressing to a point where improvement or cure becomes impossible. If one gives attention to the body as a whole while treating some single part of it that cries out in pain, or develops some other symptom of disturbed health, then local treatment or symptom therapy has its field, and a rather broad one too.

Conditions Benefited by Infra-red Treatment

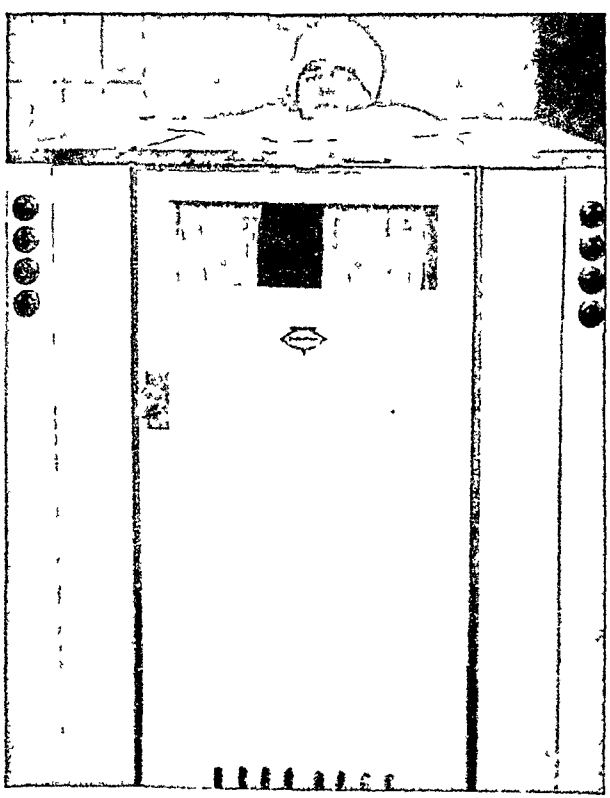
Among the conditions in which infra-red therapy, or therapy by means of radiant light and heat (sometimes called also *radiotherapy*), is of considerable benefit are congestions, inflammations, and infections. These include many abnormal conditions; but we may mention arthritis, asthma, boils and carbuncles, bronchitis, burns and scalds, colds, contrac-

tures (muscular, spasmodic and so forth), earache (especially in children and when mastoiditis is threatened), erysipelas, the exanthemata (chickenpox, measles, scarlet fever, smallpox), extravasations (escape of blood serum or lymph, or all of these, into tissues, as from contusions, fractures or ruptured muscles), gout, headaches (most kinds), hysteria, influenza, insomnia, intestinal and other infectious foci, ischemia or local anemia, lumbago, myositis (inflammation of muscle), nephritis, superficial neuralgias, neuritis, obesity, pleurisy, pneumonia, rheumatism, sinusitis, sciatica, toxemias, whooping-cough, bruises, sprains and strains, shock and various other conditions of subnormal temperature. Among other conditions in which this treatment is applicable are cases of chancroid, to the chest for cough or hay-fever, epididymitis, exophthalmic goiter, chronic gastritis, enlarged thyroid, incontinence of urine (applied over bladder and lumbar spine), general inflammations, creaking joints, chronic arthritis, leucemia, orchitis, acute and chronic ovarian disease, paralysis, peritonitis, prematurity (applied over the spine), chronic prostatitis, sciatica, stiff neck, acne, abdominal adhesions, arthritis deformans, bone diseases and wry-neck. The treatment also is very beneficial in restoring circulation and maintaining function in paralyzed limbs, provided care is taken not to burn the skin, which is easily done in these cases because of the disturbed nutrition and often because of reduced sensation. As might be expected, conditions of such extreme difference will require different exposures, as to distance and duration. To treat all in the same manner would be likely to cause serious results in some, but no attempt can be made here to give the exact technic for each. Proper exposures will depend partly upon factors other than the condition being treated, and must be determined by careful consideration of all of these. For this reason it is highly advisable that a physician be consulted in regard to most of the disorders mentioned.

Kinds of Lamps for Infra-red Therapy

There are different types of lamps giving infra-red therapy or radiant light and heat. Some have high-wattage bulbs that yield intensely brilliant incandescent light, while others have heating elements that give only a dull red glow. It is claimed by some that the more nearly the heating element approaches, during use, this latter color, the more abundant will be the

infra-red rays. In any of the lamps much heat is produced which is convective, since it reaches the body through currents of air or by radiation. Some of them are on pedestals which may be moved to the bedside or wherever desired, and some have merely a hand-grip for holding them while in use. All have reflectors for concentrating the rays where they are needed. Another form of appliance is an oblong reflector in the curved back of which may be one, two, or several bulbs. This is placed over the region of the body to be treated and left there for varying lengths of time, according to the nature of the case. A special heating pad has also been produced which is said to yield a high percentage of infra-red rays. It may produce these rays in some amounts; but, as it becomes itself very hot and is placed practically in contact with the body (with only a white towel or cloth between it and the bared skin), it is certain that it yields conductive heat also. But whether or not a particular appliance produces appreciable amounts of infra-red rays to penetrate the tissues beneath the skin, all these lamps produce convective heat as well as conductive. This combination will be serviceable in a wide variety of cases.



This illustration shows the electric-light bath cabinet closed and in operation. It is desirable to elevate the seat inside of the cabinet so that the patient's chin will have proper clearance of the top of the cabinet. This treatment is used for general elimination.

Infra-red Treatment at Home

The type of appliance one might secure for home use will depend somewhat upon price and

appearance. Some of the convective-heat appliances are very attractive in appearance, and most of them are durable; also the cost of operation is usually very low. But all, of course, are operated by electricity, and people in rural districts who do not have electricity must still resort to compresses, fomentations, hot-water bottles, and other such primitive methods of supplying heat.

Under *"Hydrotherapy"* in this volume, there appears a full discussion of various hydriatric procedures that may be used as substitutes for radiant light when the latter is unavailable or cannot be employed.

The Electric-light Bath

ELECTRIC-LIGHT CABINETS.—Today it is possible to obtain the effects of the type of bath exemplified in the Russian and Turkish baths and cabinet baths employing vapor and hot air, in a more pleasing manner, as well as with less trouble and with more benefit. This is done by means of the cabinet flooded with electric light. Many homes now have these cabinets and use them as a part of the daily hygienic schedule.

Some authorities consider that practically all of the radiant energy given off by incandescent bodies consists of the yellow and orange rays of the visible spectrum, the heat of incandescence. But considerable heat comes from rays other than these, namely the red ones. Some of the infra-red rays immediately below the visible red are undoubtedly given off by incandescent bodies, including some light-bulbs, particularly when the filament producing the light is especially prepared. By tests at the Finsen Institute of Copenhagen it was shown that the visible red rays and the very short infra-red rays emitted by luminous bodies have considerable penetrating power, much more, in comparison, than the infra-red rays given off from non-luminous or faintly luminous heated bodies. The red and infra-red rays from luminous bodies raised the temperature of tissue one-fifth of an inch below the surface four degrees higher than that of the surface, while after a similar application of heat from a *non-luminous* body, the temperature within the tissues was lower than that of the skin. Hence it appears that a relatively high temperature is maintained in the blood and subcutaneous tissues when the body is radiated with luminous rays, and it is doubtless due, in part, to this increased temperature continued for considerable

Yellow, Orange and Red Rays

periods of time that various metabolic changes of advantage to the body take place under the influence of the rays. Even the yellow rays have a penetrating power. But what health or therapeutic value there is in yellow rays has not yet been fully determined. Taken alone, they probably would have little if any effect upon the tissues. In combination with other rays, they probably aid in activating some chemical changes and vital processes. When we consider the claim of some scientists that it is the visible rays, red and yellow, that produce the changes within the green leaf that result in the building up of carbohydrates—if that claim be true—we cannot doubt that these rays are of vast importance to our own bodies, even if we do not know just what or how they operate.

In the electric-light cabinet, containing from about thirty to fifty bulbs, one sits upon a covered stool or chair, in a flood of light reflected from the mirrors or special materials forming the lining of the walls. The head is in the clear atmosphere outside, the cabinet being provided with folding top doors having a circular neck opening. Beneath the feet, in some cabinets, are additional bulbs under a firm platform of glass. Thus the luminous rays strike every portion of the body



This illustration shows the interior of an electric-light bath cabinet, used for an electric-light bath.

Technique of Electric-light Cabinet Bath

except the head which, during the bath, is usually protected with a cold wet turban. Often a cold cloth is placed about the neck as well.

Advantages of Electric-light Cabinet

The superiority of the electric-light cabinet bath over the Turkish or Russian bath or hot-air or vapor cabinet baths is considerable. The surrounding temperature in the latter has to be higher than that of the body, in order to produce marked skin activity with the resulting profuse perspiration, but in the light cabinet it is *below* that of the body—from 96 degrees even to as low as 85 degrees. Yet in the light-bath perspiration appears much sooner than in the other baths. It must be concluded from these facts that the radiant light and heat penetrate the tissues more deeply than the conducted heat, and that they greatly increase cellular activity, heighten metabolism and energize the circulation from within outward.

It is for this reason, no doubt, that the light-baths have a bracing effect. Hot-air and vapor-baths, even though followed by tonic applications, often leave one weak and exhausted for some time afterward; but after the light-baths one usually feels as vigorous and energetic as before—often more so—in spite of the profuse perspiration produced. But, as with all superheating procedures, there should be a cold or cool tonic application afterward. It is usually best to have some form of hot bath ready for immediate use upon stepping from the light cabinet. A shower bath is best, a tub bath perhaps next best, for the entire body should be under the influence of the hot (or decidedly warm) water, so as to avoid chilling and reducing the ability to react after the cold or quite cool bath to follow at once after the rinsing off with the hot or warm water. If this plan in followed, there will be no danger of poor reaction and one will be able to go out of doors immediately upon dressing, without danger, though, in severely cold weather, the tonic application should be fully cold, or one should wait until complete reaction is assured. This may be made more certain by exercising for a few minutes after the bath and drying are completed, unless there is some physical condition contraindicating such exercise. A further advantage of this bath is that the heat and light are uniform. Thus exact prescriptions can be given when necessary, which cannot be said of the vapor hot-air cabinets.

Termination of Cabinet Bath

There are many conditions of ill-health in which the electric-light bath is beneficial. It has the same general indications as the *Russian Bath* and the *Turkish Bath,* as mentioned under *Hydrotherapy.* Because it produces perspiration so quickly and freely (the quantity often being double that in the Turkish bath), it is especially valuable in diabetes. In cardiac disease, obesity, toxemias of gastrointestinal origin, and in dropsy from disease of either the heart or kidneys, this bath is of particular value. Good results are secured also in chronic malarial poisoning, chorea due to mimicry (habit chorea), migraine, neuralgia, neurasthenia and neuritis, hysteria, syphilis, and tetany. In conditions resulting from pronounced general toxemia, such as chronic rheumatism, the light-bath is superior to all other baths. When the heat-producing capacity is reduced, as in anemia, it is excellent to heat the body thoroughly in preparation for the tonic cold applications necessary for overcoming the condition. Arteriosclerosis and high blood-pressure, insomnia, general gastrointestinal disorders, premature senility and mental diseases are benefited greatly by the light-bath, and various abnormal states of health classifiable under diseases also respond favorably to it.

Uses of Electric-light Bath

As a general hygienic agent for improving the functioning of all organs and thereby reducing the susceptibility to disease, this light-bath is of much value. It aids in the oxidation of systemic wastes, especially protein wastes, and in increasing general metabolism and vital combustion, while increased skin activity hastens elimination of waste products, including those formed by the heightened cell activity. This bath is not a panacea for all ills. Of itself it will not cure any abnormal condition or give immunity to disease. But as a prophylactic agent it is of great value, especially when used in conjunction with other agents and practices tending to promote and preserve health. It is especially beneficial for those living sedentary lives, such as most professional men and women and a large number of other women who deny themselves adequate physical exercise and fresh air. The vast majority of people never bring about perspiration intentionally, often, in fact, doing all they can to prevent it. This is one of the most potent causes of illness and reduced health among civilized peoples. But in the electric-light cabinet bath we have cleanly, enjoy-

Light Baths Prophylactic against Disease

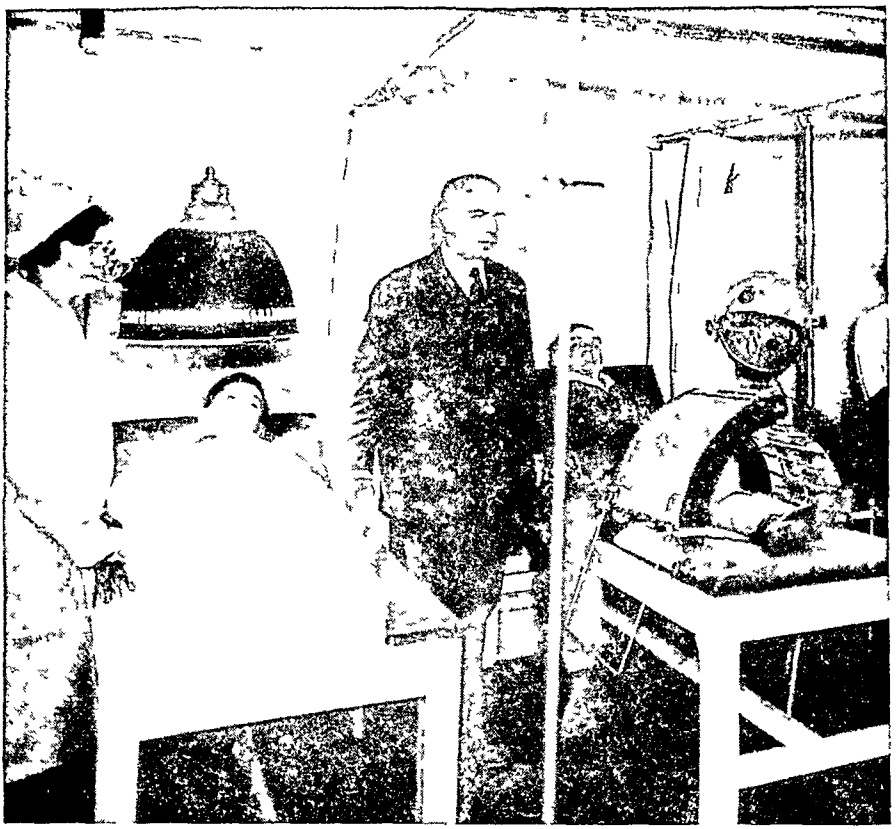
able, convenient, non-laborious means of producing a profuse perspiration. This cannot be considered as a complete substitute for sweating provided by physical exercise; but those who will not or cannot take enough exercise for this purpose cannot do better than to induce sweating through the light-bath.

Frequency and Duration of Light Bath

Whether used for prophylactic or hygienic, or for therapeutic purposes, the frequency and duration of the light-bath will depend upon the general condition of the subject, as well as on any abnormal condition that may be present. Once or twice a week will be sufficient for the majority of persons using the bath for hygienic purposes. The person desirous of gaining weight may use it with good effect, for the improved digestion, assimilation, and elimination will have a favorable effect upon the metabolism and weight. But one a week will be ample for most of these cases. In obesity, epilepsy, rheumatism, and pronounced general toxemia, two or three baths a week may be taken for some time. But directions cannot be given here for the proper use of this agent in the various abnormal conditions in which it is of value. It should not be used promiscuously and indiscriminately; there are conditions in which harm may result unless proper precautions are taken.

Precautions of Local Light-bath

Some nervous people become hysterical or otherwise "upset" under the influence of the light-bath. Much of this is psychological, but nevertheless it has physical effects. If such persons cannot be made to see the benefit and the safety of the bath, it must be avoided or used with much caution. Since the considerable heat to which one is subjected may be quite depressing, especially to the heart, it is advisable, often necessary, to protect the heart during the bath by placing a cold compress or an ice-bag over the heart region. This depressing effect is insignificant or unnoticed in most cases, and usually is entirely overcome by the tonic application that should follow. In some skin disorders, particularly when there is burning or itching, or when there are moist eruptions, the light-bath may be too exciting. This does not apply to psoriasis or to eczema, except the weeping form of eczema. With the exception of the slight fever occurring with acute colds in fairly vigorous individuals, any fever condition is a contraindication to the



At the left, patient is shown receiving treatment by electric light. At the right, a local leg-baking treatment is being given to patient.

bath. Aside from these conditions, there will be individual conditions in which it might be unwise to use the general light-bath, or in which special precautions might be necessary.

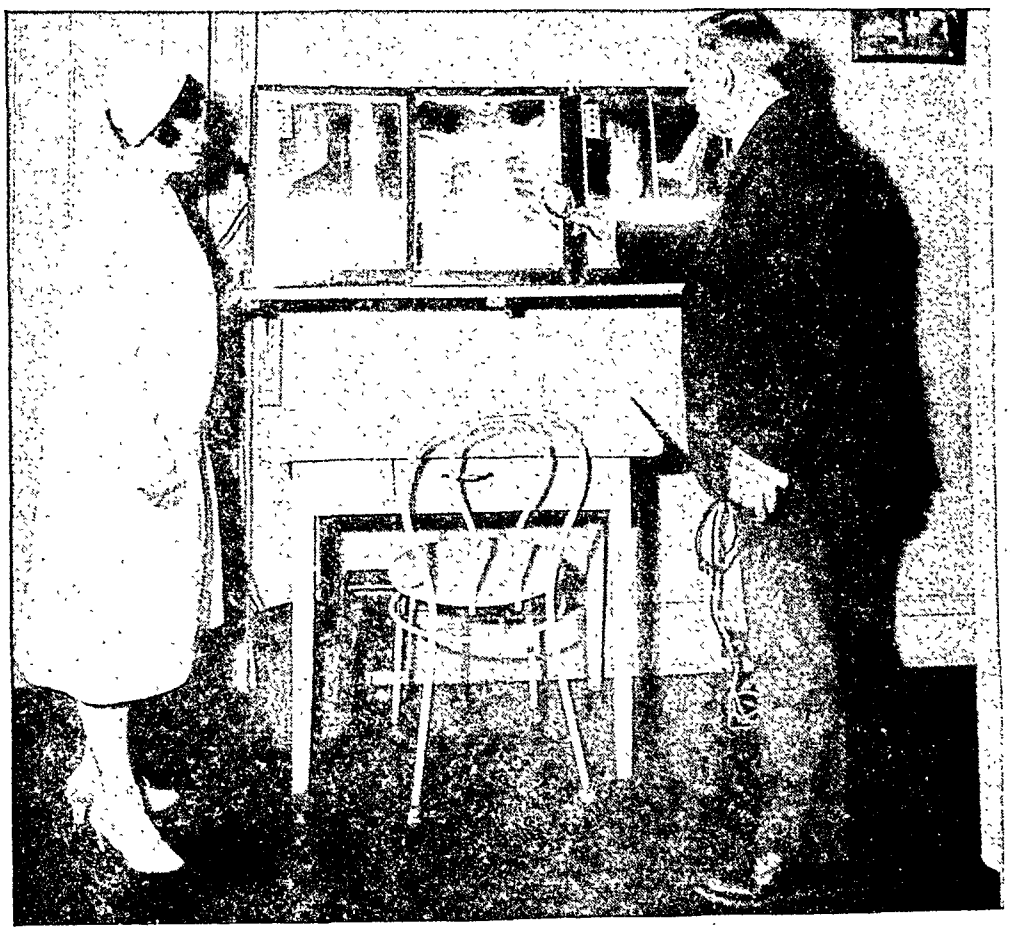
Ailments Responding to Electric Light Cabinet

The electric-light cabinet is such a valuable and convenient means of providing heat to the entire body that it is being installed more and more in the bathrooms of private homes. When its use becomes general, an important step toward the maintenance of national health and the reduction of disease will have been taken. The following are but a few of the many conditions greatly relieved by treatment in the electric-light cabinet: boils, carbuncle, defective circulation, general cold, dropsy of pregnancy, eczema, beginning fevers, fish-skin disease, scleroderma, catarrh, ozena, obesity, peritonitis, chronic rheumatism, syphilis, tetanus, chronic alcoholism, asthma, and high blood pressure.

X-ray Therapy Not a Treatment

is often called *skiascopy* (from Greek words meaning "I examine by shadow"), and *fluoroscopy* (from fluorescence and the Greek word meaning "I examine"), the last term being the most commonly used of the three.

More and more x-rays are being used in the treatment of various diseases, but in conjunction with and as a complement to other physical therapies, perhaps especially actinotherapy. In many diseased states for which they are commonly supposed to be useful, however, they have no value, and actinotherapy tends to supplant, in many minds, any idea of roentgenotherapy. The latter nevertheless has a field which, although somewhat restricted, is not likely to be usurped by any other therapy. The dangers associated with its improper use are such that the public needs to be cautioned *never to submit to x-ray therapy upon the advice of a single*



A cabinet for x-ray plates, such as the above, is valuable as an aid of diagnosis. It enables the physician or x-ray specialist to read his plates and make comparisons. What is discovered on the x-ray plates not infrequently determines the treatment to be given.

physician, nor unless administered by a skilled roentgenologist.

It is evident, therefore, that x-ray therapy hardly can become a home therapy, unless in the home of a physician; and, that being the case, there is no need to dwell upon the subject at great length in these pages. It seems advisable to present it, however, along with other therapeutic specialties of which the same may be said, in order that the reader who desires to familiarize himself with drugless measures may not be ignorant of an agent of great value when properly employed.

Different x-ray doses are used for different effects: stimulative, inhibitive, destructive, and solvent. The last, which is sometimes called *ionizing x-ray therapy,* is safest and of service in the greatest variety of diseased states. In this therapy the dose is very small, the effects being more diffuse than local, yet very positive. It is often used in connection with ultra-violet rays, infra-red rays and certain other physiotherapeutic

Various Effects of X-ray Therapy



An x-ray photographic apparatus in operation. Although used principally for diagnostic purposes, x-rays are valuable in a few selected types of disorders, but are not valuable in many of the disease conditions for which they are sometimes used.

agents. These other agents seem to intensify the effect of the x-rays; hence minute doses become very potent, yet safe—the effects being entirely different from those we usually associate with x-rays.

Radio Short Wave Therapy (see also *Artificial Fever*, Page 2750).—Radio short wave therapy is a modern method of producing deeply penetrating heat within the tissues of the body. It is an improved development of medical diathermy, in which the heating of local tissue by high frequency electric currents is employed. The principal difference between ordinary medical diathermy and short wave currents is that the short wave currents will pass through ordinary insulating material. Direct contact of metal electrodes with the skin is thus rendered unnecessary. Short wave treatment can be given in much less time than can ordinary diathermy treatment, often with better results and with less chance of producing skin burns. Short wave electric currents are oscillating. They do not flow constantly in one direction, but oscillate or alternate rhythmically, reversing their direction of flow each half cycle. These currents are of various voltages, amperages, and frequencies. Yet they all follow certain unchangeable electric laws. Short wave currents are applied by the use of insulated pads against the surface of the body, or by the use of discs or plates which do not touch the surface of the skin but are kept at variable distances from the skin. They are also applied by what is known as the induction method, involving the use of an insulated cable which is wrapped about the parts to be treated.

Radio Short-Wave Treatment

The length of time of treatment varies but is considerably less than in the ordinary medical diathermy treatment. The application of radio short wave causes the generation of heat in that part of the body within the electric field, producing dilation of the blood vessels and a consequent hyperemia. This form of treatment has been recommended for cases in which heat within the tissues is helpful. Such treatment is useful in many cases of chronic arthritis without bony ankylosis, in neuritis, neuralgia, lumbago, chronic female pelvic conditions, sinusitis, bronchitis, infections, boils, carbuncles, pneumonia, and other conditions where deeply penetrating heat is beneficial.

RADIUM THERAPY—Radium possesses more than any other substance the properties known as radioactivity; liberation of light and heat, the power of ionization (dissociation into ions), and the production of rays having power to pass through opaque bodies, affect photographic plates with impressions and cause various biological changes. Other radio-active minerals, possessing less of these properties, are uranium, polonium, actinium, and thorium. It was while investigating the phosphorescence of uranium salts that Professor Henry Becquerel, of Paris, discovered in 1896 the property of radioactivity. Radium itself was discovered in 1898 by Madame Curie, of Paris, and immediately became a source of hectic inquiry and controversy.

Radio-activity

Radium (so named by its discoverer) is a metallic element of great weight, non-existent in a free state, but extracted in minute quantities from pitchblende (uraninite). It is 100,000 times greater in radioactivity than uranium, its nearest competitor. Radium gives forth three kinds of rays known as *alpha, beta,* and *gamma* rays. The first two are emitted with great velocity, especially the alpha rays. Both are charged with negative electricity, but the beta rays have greater penetrative power than the alpha. The gamma rays are not electrically charged particles, as are the other two rays, but waves very similar to, perhaps identical with, x-rays. They have great penetrative power and are not deflected by a magnet as are the other two. A very minute portion of radium will give off these rays without its own reduction for "ages."

Radium

The effects of radium and x-rays upon the body are much the same, the tissues having the least resistance being attacked more vigorously by both than are normal tissues. Upon this principle the therapeutic use of radium depends. But, as its cost is almost prohibitive, x-rays are used if the effect of the two agents is considered to be the same in a certain case. Because the amount of radium needed is so small, it can be used conveniently (in suitable containers, or by means of suitable applicators) in the interior of tumor masses, and be applied to certain internal organs. It can be placed under the eyelid, in the ear-canal, in the nose, mouth, throat, esophagus, stomach, rectum, vagina, or uterus. It can also be used in the treatment of patients who cannot be taken to x-ray depart-

Convenience of Radium Therapy

ments or offices. For these reasons it is selected for a variety of disorders and for many cases. In case of malignant tumor it is often placed (in sterile tubes) in the interior of the tumor mass through incisions.

As with destructive doses of x-rays, radium therapy has not been found universally safe and its use is attended with much danger from destruction of normal tissue and great scar formation. In case of inoperable cancer radium sometimes checks the progress of the growth, and may reduce it to some extent, occasionally making it an operable one. But as a rule malignancy is not benefited by its use. In some forms of ulcerating and non-ulcerating epithelioma of the skin, in rodent ulcer, superficial birthmarks, keloids, lichen, and psoriasis, radium has been used with greatest benefit, though in the case of psoriasis recurrence is very likely.

Radium Capable of Causing Irreparable Damage

Improperly used, or when used for some condition in which radiation reaches the testicles or the ovaries, both radium and x-rays are likely to produce sterility. The effects of treatments by both of these agents are cumulative; that is, single short applications may be safe, but, if repeated often enough for their slight effects to overlap, symptoms of overdosage may appear more or less suddenly. On the whole, the results obtained by radium scarcely warrant its continued use, unless it be in the few conditions mentioned above. But, when used, it should be under the supervision of a physician of wide experience in this treatment, who has seen enough of the harmful effects of wrong use and overuse to be extremely cautious. Except in cases of a highly specialized sort, a combination of the more usual physical therapies will accomplish all that radium and x-rays still attain.

Radium Emanation, or Radon

Radium Emanation, or radon, is a radioactive gas proceeding from acidulated radium salt solution (radium salts being bromide, carbonate, chloride, and sulphate). It seems to settle on other substances as "an infinitely fine powder," thus imparting to them temporary radioactive properties. It has a small amount of alpha-ray and gamma-ray activity. An *Emanatorium* is an institution where radioactive waters are drunk and radium emanations inhaled for the treatment of disease—usually with meager results.

There have been exploited so-called radioactive substances

for prophylactic or curative purposes. Some of these consist of so-called radioactive earth or stones, to be placed in jars (also said to be radioactive), in which water for drinking purposes is placed. After standing in these jars for a time, the water is supposed to have become radioactive and to have some of the properties of radium in small doses. The effect is said to be that of stimulating cell activity and general metabolism. Clay or other earths said to be radioactive are placed in containers of chamois or other soft material for application to various parts of the body. The supposed emanations, presumably, are expected to penetrate to the seat of trouble, wherever that may be. If there is any radioactive substance in the rocks or the earths used, it will have the effect of imparting limited radioactive property to other substances. But many of these articles or substances are totally lacking in radioactive properties, or the radioactivity is so insignificant that no biological effect can be produced by it. They recall the old-time electric belt, long since fallen into disuse, or of the practice of laying a coil of electric wire in a jar of drinking water and turning on the "juice," with the anticipation of obtaining a charge of revivifying electricity in homeopathic doses upon drinking the water. In short, the majority of these devices have no value except what may be due to the influence of suggestion. They have the advantage that they can do no harm, which cannot be said of all radium treatment; but it should be most emphatically stated that cancer is not one of the disorders that should be so treated. It is a disease in which delay in securing proper treatment may be fatal.

Radio-active Properties

ELECTRIC TREATMENTS FOR ILL HEALTH

Section 6

TOO MANY people light therapies are phases of electrotherapy. Light therapy belongs to physiotherapy, but not to electrotherapy; for, though all therapeutic light apparatus employs the electric current in the production of its various rays, electrotherapy employs the current itself, modified in some special manner, upon the body. Electrotherapy is still ignored, even regarded with distrust, by a large portion of the medical profession. But those who have had opportunity or have taken the time to master the technique of its application, as they do their other remedies, for effects to be produced, have been convinced that electrotherapy has its place in the scheme of therapies and that this place should be a prominent one.

Electrotherapy and the "Quack"

Electrotherapy has been somewhat discredited by the fact that it has become a rich field for the "quack." The irregular practitioner may know little about electricity or the instruments he is using; his instruments, indeed, may be quite useless. But because of the "front" he puts on—with the appointments of his office and his glib pseudoscientific chatter—he attracts the thoughtless and ignorant, the reckless and desperate, some of whom may secure a measure of relief from their ills through suggestion.

This suggestion is, to a great extent, self-applied by the patients, for many people are easily impressed by what they do not understand. They think that if a therapeutic appliance is large and complicated, emits some weird noise, or produces some unusual effect, it must be very efficient.

Too often in the past the impossible has been expected of electrotherapy, and even at present some unreasonable claims are made for it. In addition it has frequently been tried haphazardly, without proper selection of cases or sufficient knowledge of technique. By its misapplication great harm—sometimes even irreparable harm—has been done. In some

cases the injurious effects are the direct result of the treatments themselves; in others they are brought about indirectly by causing disastrous delay in securing the treatment (electrical or other) which the case actually requires.

A further hindrance to the development and acceptance of electrotherapy is the inadequacy of the courses given by the medical colleges, some of which omit the subject entirely. Graduates of such schools, adhering to the belief that anything not included in their medical courses must be of little value, take up electrotherapy only perfunctorily—if they do so at all—or because some of their fellow practitioners have been getting results with it.

It is not strange, therefore, that today many physicians have in some corner of their offices one or more pieces of electrical equipment, perhaps dust-covered and no longer used. Upon their own failure to obtain what they had hoped for from these inefficient or wrongly-used appliances they may have based their opinion of the entire field of electrotherapy.

No attempt will be made here to go into detail regarding the various modalities and apparatuses and the technique of electrotherapy, for such treatment is distinctly not for home use. Mention has already been made of the small "violet-ray" generators found in many homes and commonly sold in drug stores and elsewhere. So far as the use of these goes, they rightly belong in the field of electrotherapy rather than in that of phototherapy, under which they were mentioned; for the body does receive a small amount of "high-frequency" current from them. But they have no real therapeutic value. Electrotherapy proper cannot be toyed with; no effective electrotherapy appliance is a toy or plaything in any sense of the term. Such appliances can be utilized successfully only when the properties of electricity—physical and physiological—are understood. And there is still much to be learned regarding the nature of this great force.

Electrotherapy a Valuable Adjunct

Electricity may be generated from different sources and modified by different influences; but all its forms, as we know them, are essentially different manifestations of the same force. These different manifestations, however, are capable of producing different effects upon the body, so a knowledge of their particular influence upon the cells is necessary to the electro-

therapeutist, as well as knowledge of the physics of electricity.

Kinds of Currents for Electro-therapy

The several forms of electricity used in therapeutics are the faradic, galvanic, static, high-frequency, and sinusoidal currents. The first two of these forms were originally the only ones used therapeutically. Static electricity came into use later, and still later the high-frequency and sinusoidal currents. Some physicians, even those specializing in electro-therapeutics, use only some of these forms, especially the last two named, while some use other or all forms. Since there is some overlapping of therapeutic effects from certain of the forms, a specialist may consider that he does not require all of them to secure practically all the possible effects of electricity.

Faradic Current

FARADIC CURRENT.—The chief effect of faradism (after Michael Faraday, English physicist, 1791–1867) is contraction of the muscles. Depending upon certain factors, within the control of the operator of modern appliances, the contractions may be made so rapid as to seem to be continuous, or they may be slowed down to produce noticeable rhythmic movements. There will be no muscular contraction when the motor nerve to a muscle has degenerated; but in paralysis without degeneration, and in the case of weak muscles, the faradic current is used with excellent effects, aiding much in maintaining healthy conditions within the muscles-tissues. This current is used also as a general application and by means of baths, the current passing through the water of the bath to affect the immersed part of the body. Applied in these ways faradism has a decidedly tonic effect.

Effects of Faradic Current

When employed in mild currents there results an agreeable and soothing sensation of vibration. But it may be employed in strong current for pronounced stimulating or counter-irritant effect. It is often applied by means of large sponge or dry wire-brush electrodes, the latter producing considerable pain if a fairly strong current is used. Yet there are specialists who prefer this treatment for some neuralgias, as it usually gives considerable relief if continued for five or ten minutes. Because of its stimulating effect upon the circulation of the blood and lymph, the faradic current is often used also as an aid in the absorption of effusions.

It has the further effect of producing cutaneous hyperemia, which makes it of some value in relieving congestion of deep-

seated organs; but several methods by which this can be accomplished have already been discussed, and some of these, notably local light therapy, are superior to faradism for the purpose. General faradization has a favorable influence upon nutrition through its influence upon the circulation and all vital processes. But, again, there are other agents by which this may be accomplished more effectively, perhaps especially by the general electric-light bath. An effect sometimes produced by faradism is the production of restful sleep. To accomplish this the treatment must, in many cases, be most carefully given; else the nerves will be somewhat stimulated rather than soothed. Among the conditions which are greatly benefited by the application of the Faradic current are the several forms of motor paralysis. It is also of considerable value in the treatment of chronic gastritis.

GALVANIC CURRENT.—This current was named after Luigo Galvani, who discovered it late in the eighteenth century. It shows itself in various ways, but one of its important characteristics is the ability to cause .muscles to contract, whether applied directly to it or to the motor nerve, whereas faradism will have no effect upon muscle-tissue unless the nerve is intact. As it will cause muscular contractions that cannot be obtained by any other means, galvanism is very beneficial in improving the blood and lymph circulation and hence the nourishment of muscle-tissue and in bringing about some or such regeneration in the affected nerves in certain abnormal conditions of the nerves and muscles, such as some forms of neuritis and atrophies. When the peripheral motor nerves are injured or diseased, or, when the motor nerve-cells in the spinal cord are similarly affected, the reactions obtained upon galvanic stimulation differ in some manner from the normal. These reactions are called the *reactions of degeneration*. They are used a great deal and are of much value in diagnosis of nerve disorders and certain muscle disorders; but they are also valuable in prognosis, their nature and change indicating the degree of nerve injury or repair. The galvanic current is of benefit in the treatment of such diseases as chronic gastritis (if the gastric tone is not greatly reduced), goiter (using the non-surging current), migraine, sciatica, orchitis, and many conditions of the nervous system.

Galvanic Current

Reactions of Degeneration

Cataphoresis

One form of treatment administered by means of the galvanic current that physical culturists cannot subscribe to is that known as *cataphoresis*. This is the forcing of medicinal substance in solution into or even through living tissues between the positive and negative electrodes. Not only such conditions as warts and neoplasms (new growths, or tumors) are treated in this manner, but rheumatism, neuralgia, muscular pains, acute and chronic gonorrhea and other systemic, toxemic, or infectious conditions. Opponents of inorganic medication cannot approve of cataphoresis, even though the medicinal substances must necessarily be in infinitely minute subdivision.

Electrolysis

When the electrodes of the galvanic current are immersed in water with the current flowing, hydrogen and oxygen (of which water is composed) are separated. This power of galvanism to separate the elements of substances is called *electrolysis,* and is utilized to cause the destruction of living tissues, as in the treatment of warts, moles, birthmarks, fatty cysts, and superfluous hair. The change in the tissues at the positive pole is the same as is produced by an acid "burn," the change at the negative pole having the character of a "burn" produced by caustic alkali.

Electrolysis and Superfluous Hair

The removal of superfluous hair by the electrolytic process is a very tedious procedure, and expensive. It is not associated with great pain, but there is sufficient pain to prevent many people from submitting long to the treatment. The needle used is inserted into the hair-follicle, close to the hair, and allowed to penetrate to the bottom of the former, after which the current is turned on slowly. A slight froth appears about the needle, and there is a lingering soreness for a while. If several hairs close together are removed at the same sitting, the soreness will be considerable, perhaps lasting for several days, and a scar is likely to be formed. If scattered hairs are selected for removal, however, there is not likely to be any scarring, though there will be redness and pitting for several days. Cocaine is sometimes applied by means of cataphoresis to the area under treatment.

Electrolysis and Urethral Stricture

Electrolysis is used for reducing urethral stricture. In this case the aim is not to destroy any tissue, but to soften the tissues so that they can be dilated. Many men have received

treatment for this purpose, sometimes from specialists in genito-urinary disorders, with no benefit whatever, but, when properly given, this application of the galvanic current is one of the most reliable of all electrotherapeutic treatments.

STATIC CURRENTS.—Perhaps many readers will recall having seen in doctors' offices a very large glass-enclosed cabinet upon sturdy legs, with a platform shoved back underneath, possibly, also, a metal pedestal surmounted by a dangling, metal, crown-like ring. Quite a number of these cabinets are in offices of doctors who were in their prime a generation or so ago. They are static machines. Inside the cabinet are several large, round plates of glass, mica, or fiber—usually glass. When the machines are in use, these plates, side by side, revolve rapidly. Very high-voltage currents are delivered to the terminals, passing in sparks from terminal to terminal, even when these are several inches apart. The more plates there are, and the greater the speed of their revolution, the greater the output of electricity.

Static Currents

Static electricity takes several different forms, all used therapeutically in suitable cases and depending upon the connection of the patient with the apparatus. This use of static electricity is called *franklinization,* the forms of which will be briefly mentioned.

Franklinization

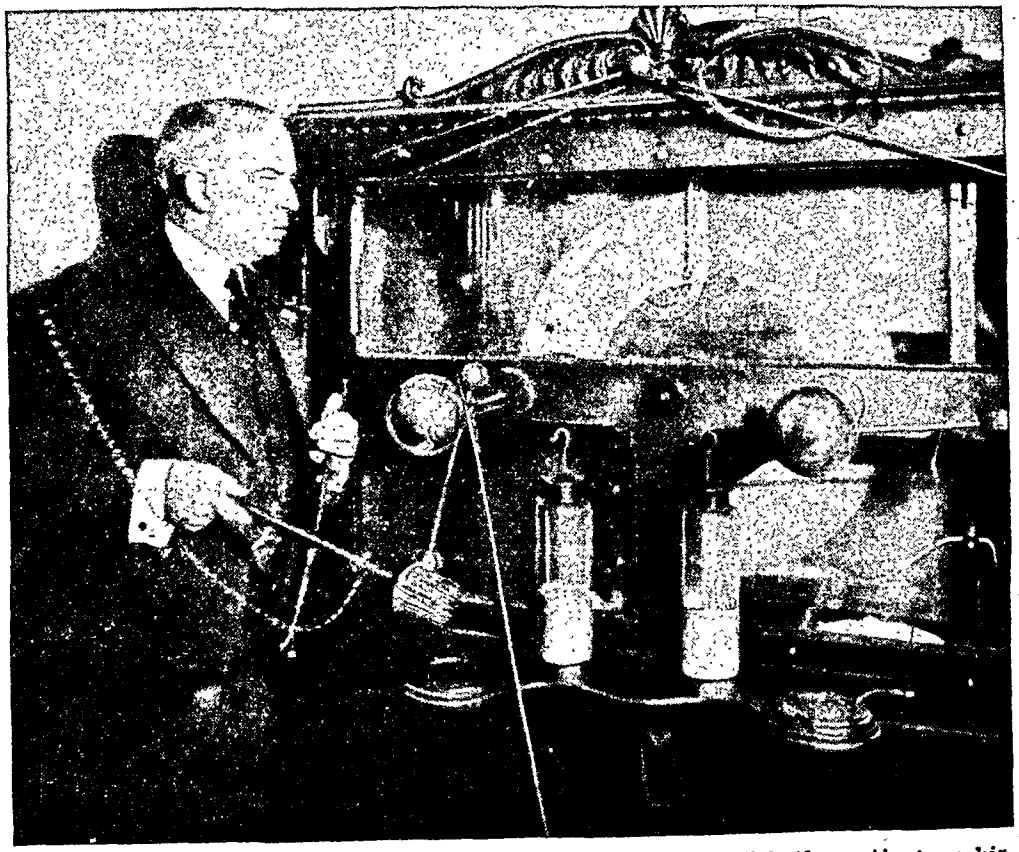
Static Insulation, or the *Static Bath.*—The patient is placed upon an insulator and is connected by a small chain to one pole of the machine. A chain attached to the other pole rests upon the floor. With the machine in rapid motion the patient is charged with static electricity. This form of treatment gives a mildly pleasant sensation, producing drowsiness, and very often relieving headache. Often patients go to sleep during the treatment, which usually continues for from ten to twenty minutes. Hence this is an excellent treatment in some forms of insomnia and in neurasthenia, also when there is low blood-pressure. It also has the effect of stimulating the skin, and of increasing elimination through the kidneys and (to some extent) through the skin. For these latter effects other modalities are now preferred, and they can be secured by means other than electric.

The Static Bath

Static Sparks are produced when the chain, which in the above mentioned connection rested on the floor, is attached to

Static Sparks

some handled metal and this metal is then brought close to the patient's body. Unless a patient has been suffering much pain, he is not likely to submit to the disagreeable pain resulting from these sparks, though this modality is usually employed when pain is not a chief symptom. If more than a spark or two passes to the patient at once, especially if a succession of sparks passes, the pain becomes unbearable. Exudates resulting from inflammations, which cause pain and defective circulation in and destroy the function of a part, are greatly reduced by the static spark, and if used sufficiently will bring about its removal by absorption, thus restoring normal function in the part previously affected. Other means, especially diathermia, are used more today for accomplishing this purpose; but the static spark is very valuable in muscular spasms and pains and in acute strains, to cause contractions in atonic muscles (See *Faradic Current, Galvanic Current*), in spinal arthritis, and, to a less extent, in other



The static machine is shown in the above illustration. With the patient or his chair and platform properly hooked up to the machine and the machine in motion, the patient may be given one of several forms of static electricity.

forms of arthritis, and in certain other conditions of adhesions and fibrosis.

Static Breeze, Spray, and Brush discharges are modifications of static insulation. When pointed rubber, fiber, metal, or wood electrodes, properly connected to the machine, are held near the patient, there is a rapid escape of electricity which gives the sensation, in the part approached by the electrode, of blowing warm or cool air or hot sand. These modalities are often called *effluve*. The application is soothing if the electrode is not held too close to the body; otherwise, there is considerable stinging accompanied by a hissing noise. Aside from being used for sedation, effluve may be used for the relief of pain, to reduce superficial congestion, and to promote healing of sluggish ulcers and wounds, though for the latter ultraviolet irradiations are better. It is excellent to prevent the development of "black eye," but will not remove it after it has developed to any appreciable extent. It gives great relief in cases of such ailments as bronchial asthma, and also in migraine, but not in the headache of indigestion.

Static Breeze, Spray and Brush Discharges

Induced Static Current is quite similar to the faradic current. It is very helpful in cases of obesity and is sometimes used for the relief of constipation. This current is occasionally used also through the crown-like electrode previously mentioned. Various wave currents also are produced by the static, for local and general effects. A general effect is a sensation of vibration through the body, with favorable influence upon the metabolism and upon high blood-pressure. The local effect is the production of muscular contraction; hence the treatment may be beneficial in muscular atony. High-frequency currents may be derived from the static machine by the use of accessory apparatus; but special machines are usually employed for the production of these currents.

Induced Static Current

HIGH FREQUENCY CURRENTS.—The ordinary therapeutic high-frequency current is "an electrical current having such a high rate of alternations or oscillations that living tissues do not attempt to contract under each impulse." What an electrician would call a high-frequency current (say 500 cycles per second, in comparison with the usual 60-cycle alternating current) would be dangerous low-frequency in therapeutic practice.

High-frequency Currents

High-frequency currents properly used pass through the body, or certain tissues of the body, without producing pain or injury, and are very beneficial in a great many abnormal conditions. Low-frequency currents, on the contrary, are the cause of "electric shock" and death. The high-frequency currents are sometimes called d'Arsonval and Tesla currents, after the French physiologist d'Arsonval and the Hungarian-American electrician, Nikola Tesla.

D'Arsonval and Tesla Currents

For general effects the two chief forms of treatment by means of high-frequency are diathermia and autocondensation or autoconduction.

Diathermia, often called *thermopenetration* and *direct d'Arsonval,* is one of the most valuable modalities in the whole of electrotherapeutics and is applicable to a wide variety of disorders. No treatment rooms are completely equipped if they do not contain a diathermia generator, and no physiotherapist is prepared to render the greatest service if he is not qualified to employ this excellent modality. Many doctors, medical and drugless, are using diathermia, some with excellent, some with poor results. The trouble in the latter cases may lie in poor equipment, but usually it is due to defective technique. Without possessing any knowledge of the physics of electricity, and with no training whatever in the technique of its use for therapeutic purposes, many doctors have installed in their offices a high-frequency outfit and expect to secure through it the good results they have heard and read about. But the technique of the application of diathermia is too exact to be "picked up" so easily; and failure to master it has been responsible for much of the condemnation of this form of therapy.

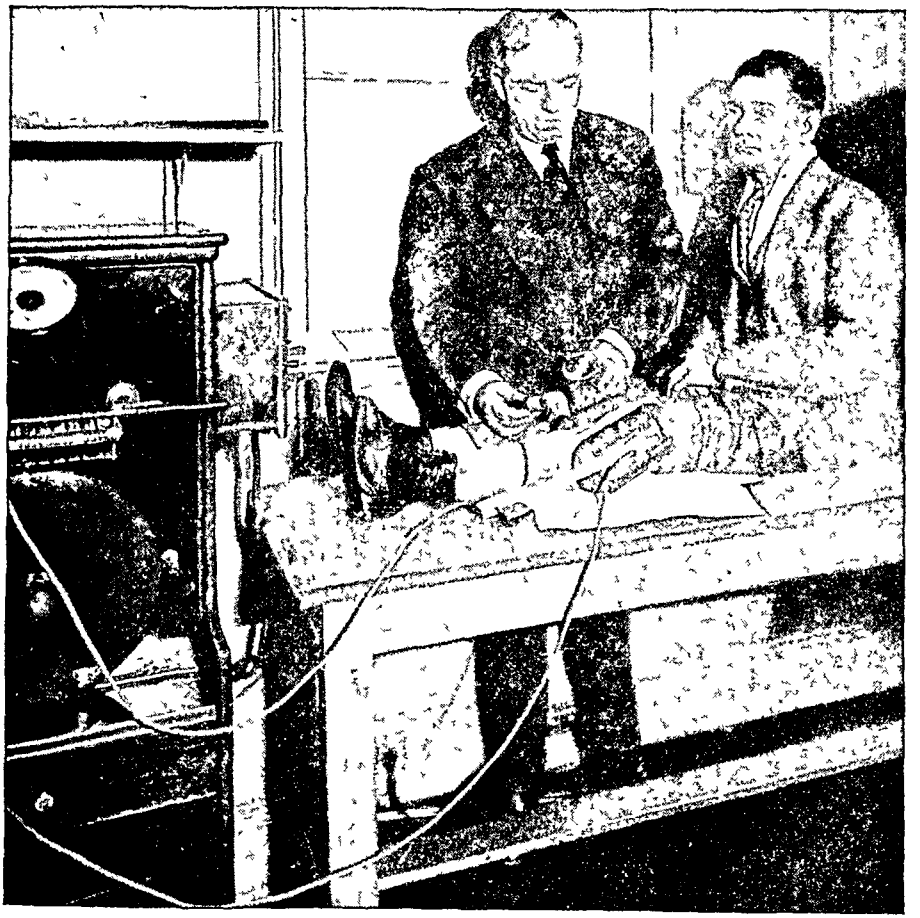
Diathermia

Technique of Diathermia

In using diathermia two electrodes are employed. The size of these and their locations upon the body have most to do with the exact localization of the heat they produce and the nature and extent of the beneficial effect of the treatment, though numerous other conditions must also be considered. Somewhere between the two electrodes, wherever placed, heat is generated as the tissues resist the passage of the current from electrode to electrode. By modifying the sizes and locations of the electrodes, also the strength of the current, heat can be generated anywhere desired, from near the surface to

deep within the internal organs, or within dense, contracted, and fibrosed tissues. This fact makes diathermia a more effective method of giving heat internally than any other now known to us. It is, in fact, practically the only method whereby some regions and tissues can be reached. Diathermic heat is not produced in the tissues from heat generated in the electrodes, for the electrodes remain cool or become barely warm. It results from chemical and metabolic changes induced by the electricity, and may vary greatly in degree. To the patient it may seem for a time that no heat is being produced; but, unless there is such reduction of the current that only a very slight degree of warmth is generated, it will ulti-

Nature of Diathermic Heat



Showing the use of diathermia. In applying the electrodes, care must be taken that they fit snugly to the part. Sometimes it is advisable to apply lather to the part to obtain better contact, as is being done here. Diathermia is valuable in many chronic inflammations, as well as in cases of muscle-contraction.

mately be felt somewhere within the tissues or organs treated.

All parts of the body conduct electricity, but like all other conductors they offer some resistance, which varies in degree with the nature of the tissues. Thus scar tissue and fibrous tissue are more resistant than normal tissues which are less dense. The more dense the tissue or organ the greater the heat produced by the same amount of current, and the lower the current necessary to reach the point of heat tolerance. This point is usually reached before any harm can be done, but in conditions in which such heat is not indicated the results might be injurious, in some degree.

Surgical Diathermia

Diathermia may be used medically or surgically, different electrodes being employed for the two purposes. Some surgeons are enthusiastic over surgical diathermia, and it may be that in the future it will supersede the knife. It involves less sacrifice of tissue than cutting, although the removal of diseased tissue is more thorough; there is less shock; and the growth of bacteria is discouraged—for all of which reasons the time that the patient is obliged to spend in bed is shortened.

Fulguration

Fulguration is the term used for cauterization by high-frequency, as in the removal of neoplasms, warts, and moles. The term *desiccation* is sometimes applied to the drying up of cancerous tissue by high-frequency from the static machine with special auxiliary appliances; but this term has recently been broadened into *electro-coagulation,* and the method has been used with great success by Dr. William L. Clark of Philadelphia for the removal of cancerous growths.

Electro-coagulation vs. Cautery

Electro-coagulation is quite different from cautery. In electric cautery the current is used only to heat the instrument which is applied to the tissues, while in electro-coagulation the current is used directly, through electrodes that are applied cold.

We are less concerned with surgery, however, than with the correction of conditions that lead to this last resort. There are many conditions and stages of conditions in which surgery is absolutely necessary; but by proper treatment applied in time the development of this necessity can often be prevented, and many cases that are ordinarily operated upon could, at least, be so much relieved that an operation need not be considered. Non-surgical diathermia is of great value in reliev-

ing congestions and other conditions which, if allowed to continue, might lead to changes eventually calling for surgery, but it is used chiefly for two purposes; sedation and stimulation.

One of the most prominent indications for the use of *sedative medical diathermia* is pain; it often gives more prompt relief in such conditions as neuralgia, neuritis, myalgia, and arthritis than any other measure. In a great many chronic inflammations and in the beginning of any acute inflammation, it is of great value, also in cases of marked and painful contractions of muscles, and for the prevention of atony or its progression. Joints that are stiffened with fibrous ankylosis are benefited directly by diathermia, and manipulation of the joints is made easier by it. Both influences combine to improve the circulation, so that waste products can be carried off. Thus the manipulation can be given oftener and with further benefit. Without the aid of diathermia manipulated fibrosed joints become so painful that they cannot be touched again for some time, during which period they return to their previous condition or worse. Some other forms of physiotherapy help to prevent this, but their effect is less marked than that of diathermia.

Medical Diathermia

In inflammation of the bladder, prostate, testicles, or epididymis, and of the heart or its covering (pericardium), in angina pectoris and hardened arteries, in abnormal conditions of the female generative system, in pneumonia, and in numerous other conditions, sedative diathermia is indicated. In these, under proper administration, it produces excellent results. Additional conditions which may be helped by the use of diathermia are cough, chronic gastritis, orchitis, stiff neck, asthma, paralysis of the bladder, and bone diseases.

Uses of Sedative Diathermia

In certain conditions, as after an operation, diathermia sometimes results in hemorrhage. In such cases the modality should not be used, unless under most careful observation and by a skilled technician. If pus has accumulated in any tissue and has no natural or artificial route for drainage, diathermia often causes its rapid absorption into the blood or lymph, with undesirable results. Aside from these conditions, there are not many contraindications to the use of this excellent remedy.

Action of Diathermia

The use of diathermia for stimulating purposes—to arouse

sluggish tissues to increased activity—has not the wide application that the more superficial, sedative diathermia has; but, where indicated, it is as important and beneficial. The skilled operator or physician will know, of course, what conditions call for one or the other of these methods, and how to apply each so as to produce the desired effects. In cancer problems additional skill and knowledge of technique are absolutely essential.

Stimulative Diathermia

The physiological heat generated within the tissues by diathermia helps the body to react to disease-producing conditions and to overcome them. Inflammation is Nature's reaction to injury, toxic irritation, and infection. Diathermia assists the reparative process by increasing the flow of blood, increasing glandular activity, and producing a transudate of defensive serum and white blood-corpuscles (phagocytes) in the tissues about the capillaries. In other words, diathermia produces a local fever, which aids in the removal of causes of congestion, pain, and other local symptoms. When Nature requires additional heat to remove some special condition, such as congestions or infections, a fever is produced. This is attended with general symptoms of more or less distress, but the local "fever" created by diathermia produces no general reaction. Even in an organ or tissue already passively congested, diathermia will produce favorable effects, for it brings about a dilatation of the capillaries, the contraction of which produces the congestion.

Autocondensation is a very useful method of giving high-frequency to the entire body. It might be called an indirect diathermia. During this treatment the patient is either sitting on and leaning against a special pad in a large chair, or lying upon such a pad on a treatment couch, while holding in the hands a special electrode, unless a flat electrode, weighted to maintain closer contact, is secured over the abdomen. This latter is really a better method, since one direct effect of the treatment is to create a drowsiness which, if yielded to, will result in the dropping of the electrode from the hand, with a very unpleasant but not dangerous stinging sensation. Otherwise there is no sensation during the treatment (when not continued too long), except agreeable warmth. During the treatment, which generally lasts for twenty minutes, more

Auto-condensation

or less, the wrists usually feel the warmth first, but it is soon felt appreciably in the back and arms also. Often patients become extremely relaxed and drowsy, and, if the abdominal electrode is used, will not infrequently go to sleep.

This treatment is excellent for numerous conditions. A kind of cell massage is given, as the patient is charged intermittently with the surge of current. The treatment also has a balancing effect upon the vasomotor system. The blood-pressure, when high to begin with, often drops several points during a treatment, and sometimes does not rise to its former high point during the interval before the next treatment. As the entire body is saturated with the electricity, the kidneys participate in the benefits, and as a result most forms of kidney diseases are benefited by autocondensation. However, if there is a pronounced degree of hardening of the arteries, the first few treatments must be given with caution, though usually after a few short mild treatments longer and stronger ones can be given. Similar precautions must also be taken with patients who are well advanced in years.

Uses of Auto-condensation

Many cases of headache, especially migraine, and of indefinite pains often called "rheumatism," have been greatly benefited by autocondensation. It is very valuable in most cases of neurasthenia, particularly when other factors of treatment are employed, especially, perhaps, graduated tonic baths. Toxemias also are benefited by this treatment, though other electric modalities are of greater value, especially diathermia; ultra-violet irradiations are also prominently indicated. In no case should this treatment be relied upon solely, or even largely; but when indicated it is a most helpful modality, if not overused. A treatment too prolonged for a given case is likely to result in cramps in the arms, pronounced sweating, restlessness or faintness, throbbing of the neck vessels, and general uneasiness. No treatment should be continued long enough to produce any of these symptoms.

Value of Auto-condensation

Vacuum and Non-vacuum Electrodes.—With high-frequency machines two kinds of glass electrodes are used. One is of clear glass, filled with air or rarified gas of some kind, and is similar to the small glass applicators of the "violet-ray" machines so extensively advertised and sold in which the violet light flickers during use. The other is metal-lined and is about

Glass Electrodes

ten times as effective as the unlined applicator. When the metal-lined electrodes are applied to the part to be treated they produce heat in the tissues beneath—as much as two inches below the surface. This is a kind of indirect diathermia, differing from the direct in that the heat is generated only at a limited distance beneath the applicator, while in the direct it may, by the proper arrangement of the two electrodes, be generated anywhere. The former is, however, an excellent means of producing heat at some point not much below the surface and in the mucous membranes. There are numerous shapes of electrodes, for surface work and for reaching the mucous membrane of cavities, such as the nose, mouth and throat, vagina, urethra, and rectum.

The Sedative Treatment

There are also three methods of treatment, each having its own effect. For *sedative treatment* the electrode, properly attached to the machine, is placed upon the surface to be treated (the skin having first been dusted with talcum powder) and held in firm contact with it until the patient feels a decided degree of warmth. Then, without lifting it from the surface, it is slid to an area immediately adjacent. The whole surface of the region to be treated is covered in this way, the treatment being repeated as often as necessary to warm the entire part thoroughly. When a sedative effect is desired, the electrode is never lifted while the current is on.

The Stimulative Treatment

For a *stimulative treatment* the electrode is placed upon the skin and lifted repeatedly until the surface being treated becomes reddened. Often, instead of alternately placing and lifting the electrode, a few layers of woolen flannel are placed over the skin to be treated and the electrode kept moving over this; or one or more layers of chamois may be tied over the electrode. The more thicknesses used, the greater the resistance offered to the current, hence the greater the stimulating effect, which becomes counter-irritating when a certain point is reached.

The Counter-irritant Effect

A counter-irritant effect is produced, also, with the electrode held above the skin at the proper distance to keep a shower of sparks passing to it. These sparks are not appreciably painful if the electrode is kept moving above the surface being treated, but become almost unbearable if showered steadily upon it.

For cavity work, where the electrode comes in contact with

the mucous membrane, considerable care is necessary to prevent blistering. However, in qualified hands, this possibility need not be feared. The breaking, or rather exploding, of electrodes while in use is possible only when they are of the vacuum or clear-glass kind. If this accident should occur while the electrode is in some cavity, there might be serious consequences in more ways than one, but it cannot happen with the metal-lined electrodes.

THE SINUSOIDAL CURRENT is an alternating one, combining high-frequency and low galvanic sinusoidal currents. The alternations may be very rapid or very slow. There may be surging or non-surging currents, the surge being a gradual rise of current strength alternating with a gradual fall. This, when applied over muscle-tissue, causes alternate contraction and relaxation (rest). The sinusoidal currents are generated or produced by means of special instruments, and have their place in the treatment of numerous abnormal conditions. Chief among their uses, perhaps, is the production of muscular contraction in cases of paralysis resulting from nerve injury—after the nerve itself has been sufficiently repaired to respond to the stimulation. But they are also useful in other conditions, such as muscular atrophy, partial ankylosis, adhesions, uterine prolapse, and infantile uterus. Because of the pronounced muscular contraction it produces, the "Morse wave," one of these sinusoidal currents, is of great value in cases of ptosis (dropping) of abdominal organs and intestinal stasis or constipation. During treatment of the abdomen for one of these conditions, the internal contraction may be felt, as if the bowel, for instance, were being drawn up into normal position, or as if the peristalsis were being made stronger. This is what actually happens. These are excellent currents to use when some mechanical effect that cannot be produced otherwise is desired. The sinusoidal current is used frequently with great benefit also in bronchitis, goiter (to seventh cervical vertebra), incontinence of urine (over the fifth lumbar vertebra), anemia (to the tenth dorsal and second lumbar vertebrae), aneurism, angina pectoris, arthritis deformans, asthma (rapid current to spine), and in local atonic and in paralytic conditions.

The Sinusoidal Current

Uses of Sinusoidal Current

After a period during which it has not been well esteemed

Electrotherapy Not Child's Play

because of its exploitation by the inexperienced and unscrupulous, electrotherapy is coming more and more to be recognized as a therapeutic medium of great value. It is not a panacea for all ills, by any means; but there are some things which may be done by electricity that can be done by no other form of treatment. It is true that it has often failed in conditions that should have responded to it. Such failures may have been due to reliance upon electrotherapy to the exclusion of other agencies; but very often they are due to the selection of the wrong modality or lack of skill in applying it. Electrotherapy is not child's play. Unless one has mastered the art of its application, there are bound to be needless failures. When employed properly, it is one of the most valuable therapies in the possession of the healing profession.

MISCELLANEOUS TREATMENTS AND HEALTH FACTORS

Section 7

ONE physician has wisely said, "All paths are paths that lead to cure." Physicians who heal others, and patients who wish to heal themselves, should keep an open mind for various methods by which health may be secured. Some methods here described are ignored by many physicians of the several schools; some are ignored by practically all physicians. But, in presenting them, it is felt that in all of them there is some power for good, with little danger of harm when properly employed. Some of them involve the use of extremely fine or subtle forces, and hence may be recommended to those who are particularly sensitive to treatment.

In the treatments, given in alphabetical order in the following pages, the curative value usually resides either in a stimulation of the nerve centers, or in manual or other manipulation of various parts of the body. Combined with general right habits of living, this additional stimulation and exercise may be of great value. Not one of the following systems is recommended as in itself complete. But any one of them may be a useful adjunct to other treatment.

ARTIFICIAL FEVER (see also *Radio Short Wave Therapy.* Page 2728).—Artificially-produced fever is now a widely-accepted method of treatment in some diseases. It can be induced by hot water baths, hot blanket packs, with hot water bottle beneath blankets, paraffin baths (little used at the present time), electric light cabinet baths, electric pads, diathermy, radio short wave, by cabinets fitted with infra-red lamps and otherwise.

Measures to Produce Artificial Fever

The baths, packs, and electric light cabinets are limited in their action and are found particularly effective in many conditions, although they are of negligible value in some others. Diathermy and short wave produce high internal temperatures but are usually used for local application.

During the application of artificial fever there is an increase in metabolism, as well as in the oxidation of tissue and of toxic substances. This causes the destruction of micro-organisms found in certain diseases, and produces other favorable results in such diseases as chorea (St. Vitus' Dance), rheumathoid arthritis, rheumatic fever, and notably in venereal disorders.

Possibilities of Artificial Fever

We are learning that a far wider range of ailments, and particularly certain acute forms of fever resulting from infection, respond to artificial fever, as the practical experience of the editor of these volumes has convinced him. By the seemingly simple procedure of immersion of the body in water as hot as can be borne, keeping head, arms and legs out of water, he has raised the bodily temperature with favorable results when infective fever has threatened.

At temperatures exceeding the normal, there is increased power of the white cells to combat infective and destructive agencies. In infective fevers we can induce fever artificially, while the patient still retains vitality, instead of waiting for fever to develop by combustion of the patient's constitutional resources. True, there must be sufficient vitality in evidence to warrant raising the patient's temperature by artificial means. The supervision of the procedure by someone qualified and experienced also is important.

That under fitting circumstances we may expect favorable results is indicated by the physiological changes effected by artificial fever. The red blood cells become concentrated and there is a great increase in the number of white blood-cells, the destroyers of invading bacteria. Anti-bodies are released to destroy the toxins produced by these bacteria.

Discomfort and sometimes headache, nausea, and palpitation of the heart may develop during the application of artificial fever, and the patient must be carefully watched during the application of the treatment. Care must be exercised, especially in the use of the various electrical appliances for increasing the body temperature to a high degree.

BIOCHEMISTRY.—Biochemistry, in the terminology of general science, means life chemistry or the chemistry of living substance. But the term biochemistry is also used as the name of a method of treatment or a group of chemical remedies. The general theory of such treatment, as distinct from the

more general use of drugs, is that only the chemical elements that are naturally found in the human body should be taken into the body for health-building or curative purposes.

Thus mercury, which is not natural to the body, and is poisonous in practically all its compounds, would be strictly excluded from the biochemical remedies. But sulphur, phosphorus and iron would be permitted as remedies because these elements are in the natural healthy body.

BLOODLESS SURGERY.—Surgery without the use of the knife has gained ground in recent years. Derangements of structures and joints have been long recognized as abnormal conditions which respond to adjustment by skilled hands. But we must not overlook the possibilities of a wider range of disorders responding to such measures. (See *Orificial Surgery,* page 2679. Also see Volume III, Section 6, which describes and illustrates corrective exercises exemplifying some of the possibilities of bloodless surgery.)

Bloodless Surgery

CHIROPRACTIC.—Chiropractic, from Greek words meaning hand and efficient, is a form of spinal manipulation based upon the theory that disease is due to changes in the position of the vertebrae, such changes causing the vertebral bones to press upon the spinal nerves, thus interfering with their functions. The activity of the organs is largely governed by these nerves.

The chiropractor believes that if pressure upon the nerves is relieved, so that there may be a free flow of energy to all parts, a normal condition will be restored. His method of relieving the pressure is to adjust the displaced vertebrae by manual methods.

The spinous and often the transverse processes of the vertebrae can be felt beneath the skin, and when one knows their normal positions it is generally possible to detect any deviation. Practice makes the fingers quite sensitive. In order to arrive at a correct diagnosis, it is necessary to take into account the fact that the processes may be malformed and thus resemble a displacement. Such malformations can be checked up by examining the spine in various positions and noting the mobility of the vertebrae. To reduce the possibility of error the x-ray has come into quite general use.

Chiropractic Vertebral Palpitation

When the condition of the spine has been determined, the

patient is laid upon a special table, the operator with his hands adjusts the vertebræ to bring them into a certain position, depending upon the results desired. Sometimes the position of the vertebræ is changed and sometimes it is not, but there is always a powerful stimulation of the nerve in that location and an increase in the circulation and in the mobility of the spine.

Chiropractic Procedure

A correctly applied adjustment should be painless and if the muscles are properly relaxed before, the vertebræ can be moved with very little force. It is true that adjustments should not be continued over long periods of time without resting occasionally as the ligaments are inclined to become so stretched that the vertebræ are not held firmly in place.

To summarize: If the vertebræ are not in normal alignment chiropractic helps to replace them, even though other measures may also be required. The increased mobility of the spine and the stimulation to the nerves and to the circulation is of value in most cases. Where a vertebra has been displaced by accident, chiropractic offers a quick and effective means of replacing it. Where the displacement is due to weakness of the muscles and ligaments, however, the bones will not be held in position no matter how many times they may be replaced. Also, the body cannot be restored to normal unless the blood is pure and contains the necessary building elements. The best way to bring this about is through diet and exercise, and general right habits of living.

As pointed out by the exponents of this system of treatment, Nature accomplishes the healing of the body regardless of the type of ailment. This attitude is taken by practically all those practicing in this field. Far-reaching results unquestionably have been attained by those practicing chiropractic instructing their patients on the importance of intelligent diet and exercise. For this reason, in all fairness, the exponents of chiropractic may be considered outstanding teachers of health in modern life.

CLIMATE.—Some diseases respond to favorable climate, as detailed in treatments for various diseases as given in Volumes VII and VIII. Change of climate has been recognized as a healing agent. But unless the patient is in a position, financially and socially, to be really comfort-

able and happy in the prescribed climate, the benefit may be quite lost through financial worry and homesickness. Change of climate usually involves some change in the way of living, and stimulation of the patient's interest in his surroundings. It may also mean removal from domestic worries, or conditions which prey upon the patient's sense of duty. Where it is not possible to change the climate, the general good associated with such a change may sometimes be realized by altering the patient's mode of life.

Climate as a Health Agent

Apart from the general value of the change, there is a well-recognized relation between certain conditions of health and certain climates. In relation to health, climates are roughly classed as tonic or stimulant; sedative or relaxing; hot or cold; dry or humid. Numerous changing conditions must be taken into consideration: the amount of sunlight and cloudy weather; the condition of the soil, whether dry or moist; the direction and nature of the prevailing winds; the relation to forests or wooded areas and to large bodies of water; convenience of access; living accommodations; pure drinking water and milk; good food in abundance; and general sanitary conditions. The classification generally accepted as most convenient, intelligible, and practical is that of marine (including sea and coast climates) and inland climates. The Unites States, with its broad area, offers every kind of climate obtainable anywhere else.

Classification of Climates

Among diseases which seem to be definitely influenced by climate are: *asthma,* which benefits from mountain climbing; *diabetes,* which does best in a warm climate, either inland or coastal; *kidney disease,* which requires a warm, equable, windless climate; *malarial toxemia,* which does best in mountainous climates; *rheumatism,* which should have an inland climate providing warmth, dryness, sunshine, and equability; and *tuberculosis,* which is benefited by moderately high altitudes.

Conditions Benefited by Certain Climates

Involved in a prescription for change of climate is often the use of other relaxing or stimulating agencies, such as *rest-cures, health resorts,* change of *occupation,* or *travel.* All of these have the same purpose: to force the patient out of conditions which are wearing on him and to give the recuperative powers of the body a chance to function through some new stimulus. Very often it will be found that the real basis of the

Rest Cures and Travel

cures wrought by expensive changes of climate or patronage of health resorts is only outdoor exercise or undisturbed rest or improved diet or a change of mental attitude. Most of these can usually be attained at home if the patient and his friends and family are willing to make the effort.

COLOR.—The science of healing through the use of color, sometimes called *chromotherapy,* was originated by Doctor Edwin D. Babbitt, the author of an elaborate book entitled *The Principles of Light and Color.* The general effects of color on the nervous system and the whole vital tone of the individual are a matter of common observation. Everyone knows that light, clear colors are stimulating and cheerful, and dark, muddy colors, depressing. Nearly everyone finds green restful, and red exciting, sometimes to the point of extreme irritation. Only a very few physicians employ color as a therapeutic agent, usually by focusing colored light directly on the part of the body that is to be affected.

Color Therapy

Several different appliances are used in color therapy. The light may come from a special bulb, through colored plane glass, or the bulb itself may be of the desired color, or the light may be filtered through a glass lens filled with water. From time to time new appliances are placed upon the market, but as yet it is not easy to select the most desirable apparatus. It is probable, however, that before long this therapy will be employed more extensively. The colors may be applied generally or locally, especially to the abdomen and certain regions of the spine.

Appliances Used in Color Therapy

The effects claimed for the various colors are as follows:

Red.—Red stimulates and irritates. It is used by color therapists to relieve general sluggishness, coldness, congestion, physical and nervous despondency, and chronic rheumatism. It is said to aggravate delirium from any cause, and to be injurious to patients suffering from fever, inflammation, or excitable insanity.

Blue.—Blue is cooling, soothing, antiseptic, and anti-febrile. Blue light has been observed by color therapists to have a beneficial effect on inflammations, catarrhal affections, sciatica, neuralgia, inflammatory rheumatism, and other inflammatory and congestive conditions.

Violet.—Violet is thought by some to possess a more in-

tense electro-chemical power than any other color. It has been found to be sedative, and valuable in lowering fever, quieting nervous excitement, reducing turbulent heart-action, and calming the hysterical and insane. *Purple* and *indigo* are variations of *violet,* and are more or less similar in their effects.

Yellow.—Yellow is a tonic to the nervous system. When properly employed with a suitable lens, color-therapists have found that yellow is beneficial in cases of non-inflammatory ear-trouble and deafness due to defective nerve action.

Green.—Green, except very dark green, is soothing to the body, and acts as a restorative on the nerves.

Orange.—Orange is stimulating to the blood and the nerves. Yellow-orange, employed by means of an amber lens, is said to be valuable in cases of paralysis of the retina.

Since colors have obviously a direct effect on the general tone of the human personality, colors in dress and furnishings should be chosen and combined carefully, with reference to the needs and personality of the individuals involved. Children, especially, are very susceptible to color.

HYPEREMIA THERAPY.—Hyperemia is the presence of an increased quantity of blood in a part, a congestion. Hyperemia is one of the features of inflammation and infection—a necessary and beneficial feature. For without the increased amount of blood the infection could not be overcome. We have already learned that the blood is the one direct agency through which the body is repaired and to which all remedial measures must be directed. Hyperemia, as a method of treatment, has been used from the earliest times for the relief of pain and unknowingly, until comparatively recently, to prevent infection. Even the savage uses his lips to produce suction in case of minor wounds. Hyperemia has for ages been applied therapeutically in various ways, as by sunlight, the heat of fire, the poultice, the hot sand-bag, hot cloths, and similar agencies. Within recent years numerous other mediums have been employed, such as hot air, electric lights, steam or vapor, diathermia, "heating pads," artificial sunlight, and massage.

Hyperemia Therapy

Varieties of Hyperemia Therapy

But the hyperemia therapy to be considered here is different from any of these. It consists of artificial hyperemia or congestion induced by suction (vacuum), or by constriction of a limb between the affected point and the heart. This method

has been called, variously, "Junod's hemospasia," equalizing treatment, vacuum treatment, Bier's hyperemia, and cupping. Suction or vacuum treatment is the more commonly practiced method of inducing therapeutic hyperemia, and is often used by laymen. Many drugless physicians employ this method, leaving the constriction method for medical physicians and for surgeons.

Constriction Hyperemia.—This is more difficult to employ, though requiring much more simple apparatus. The equipment consists of rubber bands or rings, elastic cloth or rubber tubing. Whatever is used is placed snugly about a part beyond which the inflammation or affection is located, the constriction causing a congestion in the entire region beyond it. Thus venous congestion is produced, this being continued for from forty to sixty minutes. Upon release an arterial or active congestion follows. It is difficult to obtain just the proper degree of constriction, for it is of paramount importance that no pain be produced, either at the point of constriction or in the congested area, during the entire time of the application. In some instances the constriction is maintained for as long as twenty hours, and very often for nine or ten hours. Much harm will result if the treatment is overdone, especially through undue constriction. No part congested should be allowed to turn blue, though a reddish-blue tint is often produced. Many chronic and acute, superficial and deep infections are successfully treated by this method when properly used.

Constriction Hyperemia, Methods for

Suction Hyperemia.—This is much safer than the constriction method, though it, too, may be overdone. For this treatment there are available a great variety of cupping glasses, differing as to shape, size and finish, and also vacuum cups made entirely of rubber. In its early use cupping was accomplished by heating an ordinary cup and applying it quickly to the part to be treated, a small amount of suction being produced as the air in the cup cooled. But now the majority of vacuum cups are of glass fitted with rubber rims and shaped to fit various regions of the body, the air being removed by a pneumatic pump after the cups are applied. There are now available small cups for the fingers, larger ones for the breast or a considerable area of the skin, and still larger ones to receive an entire extremity. Suction from a very mild

Methods for Suction Hyperemia

to a very vigorous degree may be produced by these cups. But here again it is necessary that pain be avoided. When the suction is too severe, subcutaneous capillary hemorrhages may be produced. It is usually given for four or five minutes, then released for two or three minutes, repeated again for the same length of time and again released, this procedure continuing for forty to forty-five minutes. One or two treatments, as a rule, may be given daily. It is often advisable to apply sterile vaseline or other lubricant where the cup comes in contact with the skin, to make the suction more effective. Care must always be taken to have the cup resting on normal tissue, and to do this may necessitate a larger cup than the size of the area to be treated would indicate. When the suction is to be released, it must be done gently to allow the circulation to become balanced gradually. This is true of constriction hyperemia, also.

Suction is used for both acute and chronic conditions. By bringing an additional amount of blood, with its immunizing elements, to the affected area, this treatment is an excellent prophylactic measure against infection, in case of incised and moderately deep perforating wounds. It is used successfully in abscesses, acne, adenitis (gland) suppurations, such as buboes, in bursitis, boils, carbuncles, contusions, (including black eye), ear troubles (including mastoiditis), foreign bodies in wounds (both for drawing out the foreign body and producing local immunization), infected wounds, joint affections, suppurative mastitis (breast inflammation), muscular atrophies, lumbago, nervous disorders, paralysis, rheumatism, and a great many other affections. Many disorders of the head (eyes, nose, ears), and of the abdominal, chest, and pelvic organs also respond to hyperemia therapy.

Uses of Suction Hyperemia

For many general conditions, results are best obtained by applying suction along each side of the spinal column for a greater or less distance, using one cup repeatedly applied, each time at a different place, or using several cups applied simultaneously. Under a course of vacuum therapy along the back, over the liver or elsewhere, it is not unusual to find a discoloration and tenderness developing gradually at the seat of treatment. Along with this, a reduction of the symptoms for which the treatment is being given is likely to be noticed. This is an indication of progress and should not lead one to discon-

Suction Devices Applied to Spine

tinue treatment. Such effects, however, will not be produced with very small cups; it will require cups large enough to affect the area under treatment to a considerable depth.

There are doubtless some conditions in which suction therapy has a decided advantage over most other therapies. But, as a rule, whatever can be accomplished by it can be as quickly and as satisfactorily accomplished by hydriatric measures or some of the other drugless forms of treatment. Heat by the electric light or diathermia, fomentations, alternate hot and cold compresses, or spinal manipulations such as are recommended in these volumes, will, in many cases, produce better results than can possibly be secured by suction hyperemia. Yet it is a therapy that should not be forgotten or neglected.

Relative Value of Suction Therapy

MANUAL SUGGESTION.—Manual suggestion is not, strictly speaking, a manipulative treatment, although it does employ the hand. Those giving manipulative treatments have an excellent opportunity to discover what the hand will do when used thoughtfully instead of carelessly.

Manual Suggestion

MENTAL AND PSYCHIC HEALING.—This method of treatment may be said to depend as much on right habits of living as forms of healing generally termed physical.

Some people may dispute these statements and cite cases of healing at shrines, or by the laying on of the hands of the healer. When results have appeared to be thus suddenly secured, however, investigation will frequently show that after the religious excitement or fervor wore off, there was a return to the original condition. Cases are on record in which genuine healing seems to have taken place under the influence of spiritual causes; but in such cases it is probable that the patient, either consciously or unconsciously, has gone through a considerable period of preparation. Nor is the cure lasting unless the patient corrects his habits of living. There is no setting aside the law of cause and effect.

Man's Threefold Nature.—Many minds agree that man is a threefold being—that is, that he is possessed of spirit, mind and body. It is often necessary to emphasize the physical part more than the others because the majority of people are not ready for any extensive study and use of mind and spirit.

For all practical purposes the subject of physical culture,

in the narrow sense of the term, may be resolved into right habits in matters of diet, exercise, breathing, bathing and sleeping; so for all practical purposes the subject of mental and spiritual healing may be resolved into right habits of thinking, for it is through the mind that we direct the body and become acquainted with and learn to work in harmony with the spirit. Right thinking is a part of right living from which it should always be inseparable.

In striving for health, spirit, mind and body, each depends upon the other. If all are given due attention the best results will be obtained.

Mind as Distinguished from Brain

Functions of the Mind.—Psychology attempts to describe and explain the workings of the mind while physiology does the same for the body, including the brain. The mind and the brain are not the same thing, however, though all books on psychology contain considerable material on the physiology of the brain. In this work such information is given in the section on anatomy and physiology in Volume I.

The mind is defined as that which thinks, feels and acts, or that which acts and reacts. This is really a description of what the mind does and not of what it is. In order to discover the nature of the mind it is necessary to go into philosophy and metaphysics. But as we are chiefly concerned in learning how to use the mind properly, all of that sort of study is unnecessary here.

Generally speaking, the mind can be divided into two major parts, the conscious and the unconscious. The conscious part is that of which we are aware and which we knowingly direct. The unconscious is that of which we are not aware and do not consciously direct, but which, nevertheless, performs important functions.

It has already been stated that healing depends on right habits of living and thinking. Let us investigate right thinking further. *What thoughts are good thoughts?* The writings of Paul, Christ's apostle, give an excellent list:

"Whatsoever things are true, whatsoever things are honest, whatsoever things are just, whatsoever things are pure, whatsoever things are lovely, whatsoever things are of good report; if there be any virtue and if there be any praise, think on these things."

To quibble about just what things are true, honest, just and pure is to waste time. Everyone knows in his own heart what is right and what is wrong for him to think and do.

Importance of Right Thinking.—We should think of the *things that we want.* Many people waste hours every day thinking of the things that they do not want. They are always looking for the worst to happen. They expect to fail and to have accidents and sicknesses; in short, to have everything go wrong. Pain in the abdomen makes them immediately think of ulcers, cancer, operations, calamity and death. Their minds are so continually occupied with the things that they do not want there is naturally no time or energy left with which to seek the things they do want. If we want a thing we should think of it, visualize it and work for it.

Right Thinking

As far as obtaining what we desire is concerned this is right thinking; but we must be sure that our desires are good desires or we will still be thinking wrongly. We should want only those things which will bring the greatest good to the greatest number. Desire nothing for yourself that you would not want all others to have. Strive to be utterly unselfish by loving and serving others, for wrong thoughts are fundamentally due to selfishness.

As soon as one begins to study mental and spiritual methods of healing one is confronted with many conflicting opinions. The subject soon leads from the provable facts of psychology to the theories of metaphysics and philosophy. While there are many schools, such as New Thought, Christian Science, Philosophy, Theosophy, Occultism and Mysticism, all are agreed upon certain fundamentals. This is good evidence that these fundamentals represent truth.

Psychoanalysis.—Though the psychiatrist employs any or all of the more general treatments and health-building exercises suggested in these volumes, psychoanalysis as a specific technique has proved wonderfully valuable in getting at the source of emotional or mental abnormality. The pioneer work of Dr. Sigmund Freud of Vienna as it has been elaborated by Jung, Adler, and other disciples, is discussed at length in Section 5, Volume V.

Freud has constantly emphasized the fact that psychoanalysis is comparatively useless unless the patient can be

led through a process of *re-education.* The true psychiatrist, having led the patient to discover the source of his difficulties, either shows him how to remedy the outward conditions hampering him, or to find an adjustment to them.

Mental healing, as a practical therapeutic agency proceeds in essentially the same manner. The first step is to clarify and relax the mind so it may respond sympathetically to the immediate needs of living.

Religious Cults of Healing.—Of religious cults which make healing a part of their purpose, Christian Science is one of the most highly organized. There are other religious curative methods, such as the touching of relics, the laying on of hands and other measures. Healing through faith probably is similar to that by psychoanalysis.

Religious Curative Beliefs

One real advantage of these religious cures, when rightly administered, is that they provide an obvious means of sublimation and a training in social readjustment.

Hypnotism.—The majority of people are not susceptible to hypnotism. Even those who are susceptible cannot be hypnotized against their wills.

No one need fear hypnotism; but, although it has been used to a limited extent in helping people to overcome bad habits, there are better methods. The chief use for hypnotism is in experiment and investigation. It shows the power of the mind over the body and over forces of which most people are not conscious and it supplies convincing evidence that life is not all material.

Hypnotism

Several ways of employing mental suggestion have been worked out. All sorts of indirect forms of suggestion may be given in the form of stories read aloud, or music, or remarks in passing, or the patient may be led to follow some beneficial course by tactful encouragement, that he is not really conscious of.

Some people believe that more direct suggestion can be given while the patient is asleep. This consists of saying softly, but with decision, to the sleeper something which expresses the attitude the patient should have about himself—as, for example, "I am better. I am getting well. I am happy. Everything is all right." Suggestion is of little value unless the patient himself takes hold of the suggestion and makes it

his own. Those who merely respond passively to the one who gives the suggestion may appear to improve for the moment, but will relapse when the person controlling them is gone.

Auto-suggestion.—Suggestions given by the patient to himself are termed auto-suggestion. They are more effective than suggestions from another person because they involve some genuine psychic activity on the part of the patient himself and a real will to improve. This consists of repeating to oneself some hopeful formula in words.

When auto-suggestion is combined, as it is in some of the elaborate Hindu practices of this sort, with exercises in relaxation and deep breathing and with rhythmical movements it becomes a curative technique of great value, both psychologically and physically. Many Hindu Swamis teach such exercises. The fact that they themselves are sometimes charlatans and are likely to collect about them silly followers does not militate against the great value and interest of some of their exercises.

Hindu Practices

All forms of mental and psychic healing need to be used with caution. Undoubtedly there are many people who go from cult to cult, enjoying successive cures and conversions and taking up one fad of this sort after another. They need to forget all about their souls and submit to a little healthy exercise and hard work instead. No mental healing is worth anything unless it is combined with general right habits of living and the use of all reasonable therapeutic aids to health.

As soon as the patient can stand it, exercise, preferably out of doors, and useful occupation should cooperate with purely psychological agencies. The willingness to eat properly, to take exercises, and, in general, to obey the physician, is the surest sign of the right mental attitude which all these methods of mental healing seek to inculcate.

MUSIC AND HEALTH.—Music is of value in therapy because of power to soothe or stimulate, and to affect the emotions and arouse the impulses to action, and hence to influence all the vital functions. Music is more than a mere sequence of harmonious sounds that enter the ear. It consists of a series of atmospheric vibrations, almost electrical in their make-up.

Benefits of Music

There are three definite ways in which music may act on the body. Singing, alone or in concert, exercises the chest and the

lungs, and, in giving an opportunity for self-expression, stimulates and harmonizes all the energies. Music with a strong rhythm, such as march music and dance music, directly stimulates to action and exercise. Musical compositions of all sorts powerfully affect the emotions, and tend to take the patient "out of himself." Music is of particular value in relaxing various forms of nervous tension, and hence in allowing parts of the body affected by tension to resume their normal functions.

Among the conditions that may be directly influenced by music in some form are:

Asthma.—Singing exercises, by forcing the patient to open his mouth and breathe deeply, are of value in this condition.

Deafness.—When there is partial deafness, it is easier to catch the words of a song than the same words when spoken. This condition is one in which the vibratory nature of music is of great importance. In each case of deafness there is one note that reaches the consciousness more clearly and more strongly than all others. Those immediately above and below this note gradually diminish in their effect upon the ear until, after about two to four notes (either above or below), they become imperceptible. Repetition of such series of notes, beginning with the one most distinctly heard will sometimes have an amazing effect.

Some Abnormal Conditions Benefited by Music

Dyspepsia and Indigestion.—This is often due to nervous tension, which may be relaxed by music. In some cases music of the constructive type that builds to a climax, such as the quartettes of Beethoven, interests the patient. In other cases music combined with dancing stimulates and relaxes.

Insomnia.—Music of the more soothing type, ranging from lullabies and old songs like *A Little Gray Home in the West* to the *Nocturnes* of Chopin, according to the taste of the patient, may be effectively used in insomnia. Music that is pleasantly reminiscent, recalling old scenes and agreeable emotions in the past, seems to be particularly helpful to the sleepless patient.

Nervous Disorders.—Nervous disorders of all types yield amazingly to music. The kind of music to be used depends on the state and the natural taste of the patient. To some patients a strong rhythm is immensely stimulating. To others it is unbearably disturbing.

Tuberculosis.—In this case, as in asthma, singing, especially in the open air, is valuable for its effect on the lungs and its generally stimulating effect.

Music, even more than color, is of great general value in maintaining the vital tone of the personality. Every home should have plenty of music in it. There are few agencies so valuable as music in creating personal and group morale, and, in times of despondency or pain, none of the fine arts has such power to bring comfort and healing.

NAPRAPATHY.—Naprapathy is a system of treatment which assumes that disease is due to contractions of the spinal ligaments and the fibers of the cartilages between the vertebrae, such contractions causing pressure upon the spinal nerves and blood-vessels, or an abnormal tension upon some of the fibers of spinal nerves, thus interfering with the parts supplied by them. There is no doubt that such contractions would cause trouble, but this is certainly not the only cause of disease. On the contrary, spinal contractions are often due to inflammation which has been set up in some organ as a result of improper diet or other wrong habits of living, this inflammation irritating the endings of the nerves coming from the spine and reflexly causing the spinal contractions. Relieving these contractions will help, but it will not remove all the causes of the trouble. Any system of treatment which places the cause of all diseases upon some local abnormality, and which confines its treatment to manipulation of the spine, is unnecessarily limiting itself. Naprapathy is not, therefore, a complete system of treatment any more than is chiropractic, osteopathy, or the other manipulative treatments described under this heading.

Naprapathy: What It Is and Is Not

When used as an adjunct to right habits of living, naprapathy may be of much assistance. By relieving the ligamentous contractions it increases the mobility of the spine, which is always helpful. The treatment is specific in affecting the parts that need particular attention. The manipulation is quite gentle, consisting of pressure with the hands and fingers upon the vertebral processes. No attempt is made to adjust the bones, as it is assumed that they will return to position, if indeed they were ever sufficiently out of position to cause definite trouble, when the ligaments have been restored to normal. The mildness of the treatment recommends it to some patients,

especially children, while others prefer a more strenuous form of manipulation. It is not right, however, to judge a treatment by the amount of exertion put forth by the operator, or the degree of pressure or pain experienced by the patient. Results are what count.

As the method of diagnosis and treatment by naprapathy is quite complicated, it cannot be described here. Before one could give an efficient treatment, it would be necessary to have considerable practice under a supervisor, in addition to a thorough knowledge of the theory involved. It is not a home treatment, and those who desire to employ it will have to consult a regular practitioner of the method.

Neuropathy

NEUROPATHY.—Neuropathy is neither entirely a manipulative method of treatment nor a complete system of healing. It is a spinal treatment used to govern the blood supply to various parts of the body and is generally employed by its practitioners as an adjunct to other methods. It is not used as much now as it was a few years ago.

The theory of the treatment is that abnormalities in various parts of the body are due to some change in the blood supply, in some cases too much being present and in other cases not enough. Experience has shown that no abnormal part has a normal circulation. Hence improving the circulation should be beneficial, but, unless the blood contains the necessary tissue-building elements and is free from an excess of toxins, it cannot help the affected part. Therefore dependence upon neuropathy alone will not give very satisfactory results. When combined with right habits of living, however, it may be very helpful.

Neuropathy and Blood-supply

The blood supply of any part is governed by the size of the blood-vessels, and this is determined by the nerves which control the muscles in the arterial walls. If the muscles are contracted, the arteries are made smaller and less blood passes through, whereas if the muscles are relaxed the walls of the arteries dilate and accommodate more blood. The nerves which control these muscles are called the vasomotor nerves, and these can be affected by working on certain centers in the spine. Finger pressure, massage, and the application of heat are the methods used. Pressure inhibits nerves while massage and heat stimulate them. Applying these measures to a cer-

tain local part of the spine will produce a similar effect on the organ controlled by that part. Thus the blood supply in any region may be controlled. It is necessary, however, that the treatment be applied only to the one small area indicated.

It will be seen from this description that neuropathy is a treatment that must be applied in a very particular way, and while the method could be learned without great difficulty, it is best to leave the manipulation to a trained practitioner.

ORGANOTHERAPY.—Organotherapy is the treatment of disease by means of preparations made from the glands of internal secretion of some of the lower animals, chiefly the cow, the sheep, and sometimes the pig. In organotherapy proper, the dried and powdered glands of animals, in tablet or capsule form, are used, or a "liquid extract" of these glands is given by subcutaneous injection. The tablets and capsules, of course, are taken by mouth; the "extracts" are injected under the skin or into the muscles, usually of the abdomen or hip, sometimes in the perineum—the latter being a rather painful procedure. Somewhat more rapid effects are observed when the injections are used; but obviously, owing to its discomfort, expense, and inconvenience, this is not a popular method. Furthermore, it is very questionable if these extracts do any permanent good in most cases.

Definition of Organotherapy

Let us consider some other phases of organotherapy. Whereas a comparatively few years ago, the internal-secretion glands (because ductless and hence not known to have secretions) were considered to be remnants of some organs once needed but no longer necessary to the physical economy, they are all now known to be vitally essential, not only to physical welfare but to life itself. In fact, we might consider that we are what we are largely according to the functioning of our endocrine glands, for they control much of our chemistry and our physical and mental processes. The discovery of insulin and the effect of this product of the pancreas upon diabetes, even when a patient is almost moribund in coma, reveals the potency of one of these internal secretions. Thanks to the use of adrenalin, a product of the suprarenal capsules or glands, the response in shock or the apnea (cessation of respiration) in paroxysms of asthma is another remarkable proof of their potency.

Importance of Ductless Glands

Defective, backward children almost invariably have a pronounced endocrine deficiency. There is no doubt that defective functioning of the thyroid, pituitary and thymus glands underlies these conditions, for they are benefited and normality often is restored by the use of products containing the active substances of these glands. There are numerous other abnormal conditions as definitely glandular in origin, and as responsive to organotherapy.

These are discussed in detail in connection with the various ailments in which they are applicable in Volumes VII and VIII.

ORIFICIAL THERAPY.—Orificial therapy is a system of therapy based on the theory that many morbid or abnormal conditions are due to reflexes originating at the anal or other orifices, and that they can be relieved by dilatation or other forms of treatment of these openings. While the orifices of the upper part of the body (mouth, nostrils, ears, eyes) may be considered to some extent by orificialists, practically all the attention is centered upon the lower orifices the anus or rectum, vagina, urethra, and uterus (cervix). In orificial surgery operations may or may not be performed upon the orifices, but usually they are. In orificial therapy, as here considered, there are no surgical operations, though the surgical treatment will be mentioned. Whether surgical or non-surgical, orificial therapy has as its aim the relieving and avoiding of impingement of sympathetic nerve-terminals.

Definition of Orificial Therapy

The lower orifices differ from the upper ones in being doubly guarded by sphincters—external and internal—circular muscles that close and guard them. In all cases the external muscle is voluntary, being controlled by the cerebro-spinal nervous system; while the internal muscle is involuntary, being under the control of the sympathetic system. Abnormal conditions in the tissues supplied by the cerebro-spinal system are manifested as pain; abnormalities in the tissues controlled by the sympathetic nerve are manifested as disordered function. Because of these facts, an insignificant abnormality involving any of the external sphincters, such as a small abscess, or other irritation of the anus, may produce very severe local pain, whereas a much more pronounced and more serious involvement of the internal sphincter, or the

Lower Orifices: External and Internal Sphincters

region above the external sphincter, may exist unnoticed, because it produces no pain. Yet at the same time it may be causing vastly more damage by disrupting the functions of some of the adjacent or remote organs, through reflex irritation of the sympathetics.

A *lacerated cervix,* for instance, especially if left to heal spontaneously, may cause: first, indigestion, bowel disturbance, and the gradual development of malnutrition; then anemia, and eventually a neurosis or psychosis, through a toxin-laden blood-stream supplying the nerves not only with limited nutrition but with poisons as well.

A *tight rectal sphincter* is capable of producing such an extremely nervous state as to destroy all pleasure and even all usefulness in life. This condition may profoundly affect the respiration, reducing the breathing to mere shallow waves, or it may cause abnormalities in blood-pressure, constipation, dizziness, headache, heart irregularities, nervousness, neurasthenia, piles, urinary disturbances, weakness of the extremities; also abnormal mental and emotional states, digestive and glandular disturbances, prostatic and other pelvic disorders. Many cases of most of these disorders have been benefited by rectal dilation.

Lower Orifices: Effects of Irritation on

A small *meatus urinarius* (external opening of the urethra or urinary canal) may cause abnormal heart action and extreme nervousness, and may even, in a susceptible individual, unbalance the mind. In a child this condition, or a long foreskin with a pinpoint opening, may cause convulsions. Disorders of the bladder sphincters may cause nervousness of pronounced degree, but especially voice, throat, and lung disturbances.

A *hooded or irritated clitoris* may by reflex action cause many abnormal physical, psychical, mental, or moral states; ovarian, throat and tonsil troubles, nervousness, chorea, hysteria, chlorosis, neuroses and psychoses, sexual perversion, and moral degeneracy.

Enlarged, elongated *labia minora* stimulate and irritate the clitoris during physical activity and arouse the sexual nature, or cause nervousness. A sexually sensitive nature is almost always associated with this condition, especially when the labia are also serrated or saw-toothed.

A *urethral stricture* may cause no local or reflex symptoms; or it may cause local irritation, more or less discharge, and frequent or painful urination, with reflex symptoms of tight anal sphincter, constipation, digestive disturbances, impotence or sexual irritability, kidney disease, pains in the back and lower extremities, prostatic trouble, various forms of neuroses, skin disorders and affections of the gums.

Results of Orificial Therapy

These are some of the more pronounced direct and reflex disorders resulting from abnormalities of the orifice sphincters, or of mucous membranes about the orifices.

The pelvic orifices are the points where irritations are first manifested in cases of lowered vitality and general nervous depletion, it usually being irritation at the orifice which is the starting point of many functional derangements throughout the entire body.

By orificial therapy the blood-stream is improved, the capillaries flushed, and through these effects the entire body is benefited. Not only this, but the removal or reduction of nerve impingement or irritation, by orificial therapy, affects, in a most favorable manner, every organ and every function of the body. Since these effects upon the blood and its circulation and upon the nervous system increase the reactive powers of the body, orificial therapy becomes a powerful ally of all other therapeutic agents. The conditions aimed at by orificial therapy, and particularly by orificial surgery, are undue tension of the sphincters, adhesions of or about the orifices, scar contractions, and displacements of organs—conditions which cause sympathetic nerve waste.

Orificial Therapy and the Upper Orifices

Upon the upper orifices there is little to be done in the way of orificial therapy by anyone but the specialist—except what the "finger surgeon" may do, and that is a great deal. Unfortunately there are too few such surgeons. They are usually osteopaths who have specialized upon the upper orifices, doing their work with deft fingers alone. Spurs, deviated septum and other abnormal conditions of the nose; tonsilitis, adenoids, "tight" throat, tense palate, elongated uvula, and affections of the Eustachian tube are often relieved by their ingenious work. If the layman takes the time and gives a little thought to the matter, he may improve the internal condition of his nose and throat by manipulation; but the work of the specialist is always

to be preferred to the haphazard work of the layman. See *Hay-fever* in Volume VIII, for description of the manipulations the layman may safely use.

The uses of orificial therapy are discussed under the ailments to which such treatments are applicable. See Volumes VII and VIII.

OSTEOPATHY.—Osteopathy was first practiced as a form of general bodily manipulation for the purpose of adjusting displaced bones, ligaments, or muscles. In the course of years it has grown to include more extended forms of treatment. A course in osteopathy is much like a course in medicine except for the study of materia medica and surgery. Some osteopaths approve of the use of serums and vaccines, and many use electricity, but few of them know much about diet and exercise as curative measures. Osteopaths have wide legal recognition, and are to be found in almost every community, so that it is generally to them that people turn when they have failed to get relief from medicine. They have, therefore, a great responsibility, and it is a pity that so many of them should try to imitate medical men instead of practicing natural methods of healing. Their form of manipulation is good, and, if they would only add to it a recognition of the fact that disease is fundamentally due to wrong habits of living and can be cured only by correction of these habits, they could do a great deal more good to humanity than they do. Fortunately some of them do understand this, and more and more of them are coming to see the light.

Osteopathic Procedure

Osteopathic manipulation includes a variety of movements, some of them designed to produce relaxation or stimulation, and some to adjust. The adjusting movements are given with a gradual application of force, in contradistinction to chiropractic, which uses a sudden "thrust." Since attention is given to the ligaments and muscles as well as to the bones, results are as perfect and permanent as is possible without exercise. The osteopaths are well trained in their form of manipulation and can often be of much assistance. In recent years they have perfected a form of finger manipulation for treating adenoids, enlarged tonsils, and nasal polypi, and for opening the Eustachian tubes. (See reference to "finger surgery" under *Orificial Therapy* above). Osteopathy is very

Osteopathy: Its Uses

good in cases of spinal curvature, though exercise must be added to the manipulation to give permanent results. The same is true of the osteopathic treatment for prolapsed organs, both abdominal and pelvic. Their treatment for adhesions is also very good.

The original theory of osteopathy was that disease is due to some displacement of the bones, ligaments, or muscles which interferes with the circulation and nerve supply to the various parts of the body. This theory is still the foundation of the treatment, though it is now admitted that disease may be due to many other causes as well. Some osteopaths are quite strong believers in the germ theory. As a result of this broadened view of the causes of disease, an osteopathic examination of a patient now includes almost all modern methods of diagnosis, as well as the examination of the spine and the general manual examination. Having determined as nearly as possible the exact pathological condition, the osteopath sets to work to normalize the circulation in the affected parts, to relieve any pressure from displaced structures, and to apply whatever stimulation or inhibition may be necessary to the spinal nerves. The additional treatment used will depend upon the individual and his personal inclinations, but it is seldom that a modern osteopath depends on manipulation alone.

Osteopathy: Theory and Practice

SPONDYLOTHERAPY.—Spondylotherapy is strictly a form of spinal treatment. It can hardly be called manipulation, as may be seen from the description, but since the underlying theory is similar to that of the manipulative treatments and the results are in some ways similar, it has been included in this section.

Spondylo therapy

Spondylotherapy does not claim to be a complete system of healing. It aims merely to influence the functions of the organs through governing the circulation of the blood and the nerve supply. In some respects it resembles neuropathy. The effects are produced by stimulating or inhibiting the spinal nerve-centers, so that, through reflex action, the blood-vessels in the parts controlled by those centers may be made to contract or expand, or the accelerator nerves may be inhibited and the inhibitors accelerated. For instance, the rate of the heart-beat is controlled by two sets of nerves, one of which

increases the speed and one of which decreases it, there being normally a balance between the two, so that regularity is maintained. The spinal nerve-centers influence this balance both directly and indirectly so that, by working on the appropriate center, practitioners of spondylotherapy say that the heart may be made to beat faster if it is too slow, or to go more slowly if it is beating too fast. It is also possible, they believe, to influence the size of the heart by controlling the tension of the muscle-fibers. By working on the appropriate spinal center a dilated heart can, therefore, be contracted to a certain extent. Other reflexes which may be produced include the opening of the cardiac or pyloric ends of the stomach, the raising or lowering of the blood-pressure, relaxation of the gall-bladder duct, contraction of the intestines, and contraction or relaxation of the uterus. It will thus be seen that this treatment may be of value in relieving some symptoms.

A drawback in spondylotherapy is that it does nothing to remove causes, and the effects of the treatment are, therefore, only transitory. If an organ is working faster than normal it is, as a rule, because this increased function is necessary, and to inhibit it will only delay the cure. If the organ is working too slowly it may be because it needs a rest, and stimulating it to greater activity will only make it more tired. If there is too much blood in a part, it is because extra blood is needed, and, if there is too little, it is often because more blood is required in another part. So such symptomatic treatment is not always advisable. Moreover, the reflexes will not work perfectly unless the spinal centers and nerves are in normal condition, which is seldom the case when the health is below par. Some people's nerves are very sensitive, and what would be stimulation to the average person would produce inhibition through exhaustion in their case. Others are so non-sensitive that it is difficult to produce a reflex action by the ordinary methods. But, of course, a skilled practitioner who understands the different methods of applying the treatment and how to graduate the applications for different cases will generally be able to secure results.

Spondylotherapy Strictly Symptom Therapy

There is one first-aid application of spondylotherapy, however, that anyone can use. It is stimulation of the vagus nerve by rapid vibration of the seventh cervical vertebra.

This is valuable in cases of fainting or collapse. The stimulation may be applied by placing the fingers on each side of the spinous process of the seventh vertebra and vibrating rapidly or by pounding rapidly with the fist on the same spot. The seventh cervical vertebra can be identified in most cases because of the size of its spinous process. It is the largest one in this region and can be both seen and felt as a knob beneath the skin. Because the first dorsal vertebra is sometimes larger, however, it is well to check the location by counting up from the third dorsal vertebra, which is located on a level with the vertebral end of the ridge which runs across the surface of the shoulder blade. The seventh cervical vertebra would then be located three "knobs" above the third dorsal.

The technical method of applying spondylotherapy is by means of special applicators or electricity. The applicators consist of a rubber hammer and a rubber plate. The latter is placed over the spot to be treated in order to protect the tissue, and the hammer is then used to beat upon it, thus applying "concussion." Concussion can also be applied by beating on the finger with the closed fist, but it is rather hard on the finger. If it is desired to inhibit rather than to stimulate a part, pressure is applied with the thumbs on each side of the indicated spinous process. The "violet-ray" high-frequency current can be used in place of the concussion. In this case the double spinal vacuum electrode is used, at half an inch from the skin. Half-minute applications are alternated with half-minute rests for ten or fifteen minutes. The fingers, or the rubber hammer, are more generally used than electricity. Concussion is employed to elicit reflexes, while pressure is used to relax and relieve pain. In addition to the thumbs, pressure may be applied with the balls or the flexed knuckles of the first two fingers. The method that seems to produce the best results is the one to be used. Pressure is continued until pain is relieved. This form of pressure and the concussion of the seventh cervical vertebra are about the only parts of spondylotherapy suitable for home treatment.

A Valuable Application of Spondylotherapy

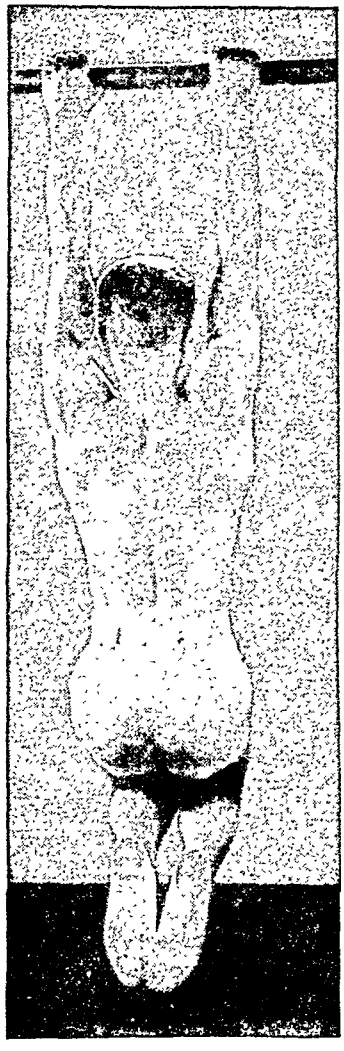
SWEDISH MOVEMENTS.—So-called Swedish movements are really passive exercises. They are generally given in combination with massage, which is also a form of passive exercise. The addition of the special movements is for the purpose of

Swedish Movements: Their Uses

causing the muscles to contract and relax in a way quite similar to that produced by active exercise. Such manipulation is more strenuous and has deeper effects than massage alone. It differs from physical exercise treatments in that the extra pressure which stretches the joints is not applied at the end of the movement and no active exercise is included.

The Swedish movements are very helpful in cases where active exercise is contraindicated or impossible. They improve the circulation and stimulate metabolism as does active exercise, but not to the same extent. They are often used to prepare a patient for active exercise and are especially helpful in cases of paralysis. No attempt is made to "adjust" the vertebrae or other parts.

Swedish Movements: Their Application



The exercises employed for increasing the height include any stretching movement, the movement illustrated above being one of the simple ones. During the movement the spine is allowed to stretch as much as possible.

In administering the treatment the operator generally massages the part to be treated and then puts it through all the motions of which it is capable, finishing with a little relaxing massage. Thus the part is gradually carried from a state of rest up to one next to active exercise and then back to rest again. The patient gets a maximum amount of benefit from a minimum expenditure of energy. As soon as he has accumulated a reserve of energy, however, he will make more rapid progress if he adds active exercise to the massage and Swedish movements, and ultimately he will reach the point where he can depend on active exercise alone.

TRACTION (STRETCHING).—Stretching is a natural method of relieving cramped and tense muscles, of arousing and energizing the nervous system, of overcoming sluggishness of circulation, of restoring vigor to weary tissues. The cat and the dog arising from comfortable quarters in the sunshine or

behind the kitchen stove, the horse and cow upon coming from the confining stable, the wild animals in the jungle and in the zoo, the baby in its crib, the tired business man at his desk—all stretch. Every human, every animal, uses this means of extending the spine and also the muscles of the trunk and of the extremities. Few people, however, have drawn from this spontaneous, natural exercise the lesson that stretching is as valuable as an aid in overcoming some of the ailments of the body and for keeping one well as it is for making one "feel good."

In Volume III stretching exercises, as well as calisthenic and gymnastic exercises, have been discussed and some have been illustrated. But we are concerned here with another form of stretching, more generally known as traction or pandiculation. A study of the construction of the spinal column, with its intervertebral cartilaginous discs and its many ligaments and muscles, as well as a study of the structure of muscle-tissue and its arrangement along the spine, trunk, and extremities, and of the more or less tortuous courses of the blood-vessels, will show why traction is beneficial.

Stretching

The spinal column is more than merely the vertical central axis of the body that supports the remainder of the framework. The systems of spinal manipulation have popularized the spinal column, and most people are aware of the fact that down through its center runs the spinal cord, and that out from this, through numerous openings, the spinal nerves pass to supply all the structures below the skull.

Traction and the Spinal Column

There are twenty-three intervertebral discs, one between each two movable vertebræ. These discs are composed of fibro-cartilage, with more or less gelatinous centers. They are all elastic and rubber-like and serve as shock-absorbers, minimizing the effects upon the spinal cord and brain of jolts, jars, and concussions. Were it not for these discs motion would be slow, clumsy, very limited, and no doubt more or less painful. These pads serve also to separate the vertebræ, and to maintain suitable space for the spinal nerves which pass out and the blood-vessels which pass in through the openings between each two vertebræ.

Vertebrae, Their Function

Many ligaments unite the vertebræ at various points, practically surrounding them. A great many muscles, also,

extend in various directions the full length of the spinal column, uniting the vertebræ, helping to hold the spinal column securely together, and making possible the many movements of the spine. But there are cartilages and ligaments at numerous points in the body, joining the head to the cervical vertebræ, the ribs to the dorsal vertebræ and the breast-bone, the lumbar vertebræ to the sacrum and the hips, the hips to the sacrum, the wing-like hip-bones to each other in front (at the pubes), and at all the joints of the extremities.

Influences upon Spinal Cartilage and Ligaments

Cartilage, having no blood-vessels, lymphatics, or nerves, is unlike any other tissue in the manner of its nourishment. It is fed through absorption by a vacuum or suction-like process. Hence, normal movement cannot be restricted without interfering with the nutrition of these structures. Connective tissue, of which cartilage and ligaments are composed, is different from other tissues in that it contracts when injured and hardens upon healing. It also contracts and hardens with age. This largely accounts for the loss of height as one becomes older.

Through long-continued improper posture, or on account of weakness, strains, jolts, jars and numerous other conditions incident to average life, the connective tissue, whether composed of cartilage or ligaments, becomes more or less damaged. This is noticed particularly in the intervertebral discs. The spinal "windows" or openings are so large that an accident, or shrinkage from old age or other conditions, rarely permits direct bony pressure upon the spinal nerves and vessels. But such conditions do have a very detrimental effect upon these structures, through the contraction of the connective tissue filling out these windows and the connective-tissue fibers that extend outward from them onto the sheaths covering the nerves and vessels. It is corrective of such conditions of the ligaments which naprapathy (page 2764) aims to correct.

Age and the Spinal Column

As age advances, the circulation of the body diminishes; less heat is produced; the walls of the blood-vessels contract, lessening the possibility of normal circulation; all the glands secrete less; all the functions associated with nutrition become weakened; elimination becomes sluggish; the suppleness of the joints and articulations give way to stiffness, allowing twists

and sudden jerks and movements to irritate or produce pain; lubricating cells and tissues dry up; muscular and other tissues harden and contract, losing their tone and becoming otherwise impaired; organs shrivel up, and function barely enough to maintain life. In short, the machinery of the body gradually wears out, and life becomes an increasing burden. Many of these changes may be reasonably considered as the result of shrinking of the spinal fibrous cushions and ligaments, inhibiting nerve-impulses from the spinal cord to the vital organs and tissues throughout the body.



Lessening the Shrinkage of Discs May Lengthen Life

A simple and safe method of stretching and straightening the spine. A secondary support provided by a strip under the chin will be found of great help in maintaining the suspended position, as it gives more confidence. It also permits a better stretch, since there will not be such a pronounced contraction of the posterior muscles.

Consider the fact that man, as is the case with animals, should live approximately five times the length of time required to reach maturity (about 125 years). Consider also the fact that between morning and night we shrink half an inch or so in height through the pull of gravity upon our fibrous spinal discs, recovering our former height during the relaxation of sleep. It requires no great stretch of the imagination to realize the gradual permanent shrinkage of these discs during advancing years. And since we know these discs to be full, resilient, and yielding in youth, and shrunken, inflexible, and rigid in old age, we must conclude that there is some rather close connection between their condition and youth on the one hand and old age on the other.

From the above we deduce that if we can postpone or hinder the shrinkage of the intervertebral discs and other connective tissues along the spinal column, or if we can overcome some of the shrinkage that has already taken place, we can, to that extent, delay or over-

come the decrepitude of age. We possess this power in some degree in traction, or stretching. Osteopaths secure many of their good results by manually stretching the contracted ligaments and muscles of the spinal column. But the individual can do much of this stretching himself. Excellent and necessary though it is, exercise alone will not produce the best traction, for during exercise some of the muscles and ligaments and some of the intervertebral discs must be contracted, shortened, or compressed. Spinal stretching is best done in an entirely different manner.

Shrinkage of Spinal Discs

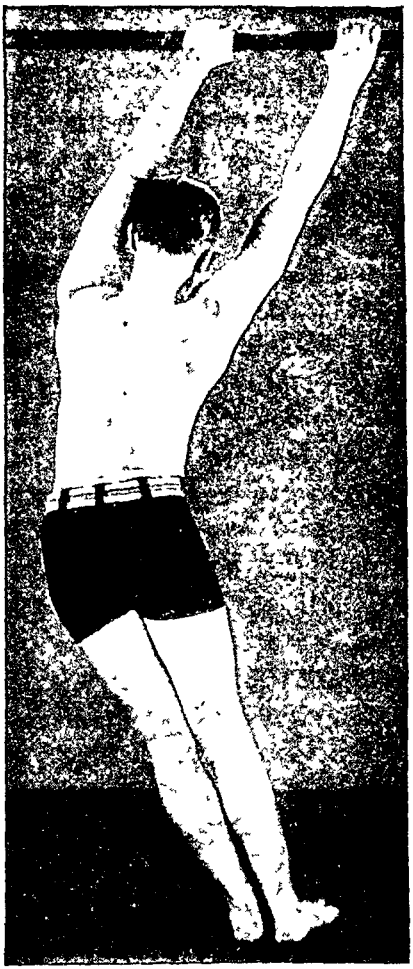


General exercise for all cases of spinal curvature. Hang from a bar with one arm only, using the arm on the side of the lower shoulder when in natural position.

There are three ways in which this traction may be done. The first is the simplest and requires but little apparatus, which can be easily put up by anyone. It consists merely of a loop or pair of loops, preferably of leather, nailed or otherwise firmly secured to the floor, a pulley overhead, through which runs a rope having a knot at one end and a double loop large enough for the head on the other end. A series of knots may be arranged on the free end of the rope if desired. The double loop may be made of soft leather, sheeting or toweling. One of these loops is placed at the back of the head, the other under the chin, the attachment to the rope being at the top of the head. When these loops are adjusted to the head, the feet are placed in the floor-loops, and the individual pulls upon the free end of the rope. This causes traction, through the pulley, upon the loop end of the rope and stretches the entire spine, as well as the ligaments of the hips, pelvis, and lower extrem-

Traction, Pulley Method

ities. Or, if desired, one may omit the foot-loops, in which case the pull upon the rope may be sufficient to raise the body from the floor. This, however, would not be advisable for one who had poorly developed neck muscles and ligaments. Again, the upper loops may be placed under the armpits instead of about the head and chin, in case one does not wish to place traction upon the neck, though if properly done and not overdone, the neck traction is a most valuable part of the treatment. One may pull the spine fairly taut, then sway from side to side, and forward and backward, with excellent effect. A more simple but less effective method of securing traction on the spine is by merely hanging relaxed while grasping an overhead bar.



General exercises for all cases of spinal curvature. Grasp the bar with both hands, keeping the feet in one place on the floor. Rotate the hips, making small circles at first but gradually enlarging the size of the circles. Later, lower the bar in order to make circles still larger.

Traction, Table Method

The second method is performed on a table made especially for the purpose. This has the foot-loops, shoulder-bars (usually padded blocks), and the loops for the head and chin, and is controlled by a lever within reach of the hand. Either the entire spine, including the neck, or the spine below the shoulders may be stretched, by using the head-loops or the shoulder-bars, respectively. This method also places traction upon the spine and lower extremities. One may also arrange to have a cross-bar well overhead (just within reach of the hands) to be grasped for the purpose of securing a direct pull upon the body with the hands, the feet being in their loops. This is beneficial for the lower part of the spine and the pelvis,

but, does not stretch the upper spine well, because of the contraction of the upper spinal muscles, and it does not stretch the neck at all.

The third method is by a motor-driven tractor. The table for this usually (though not necessarily) has an opening several inches wide and about the length of the average spine, below which is placed a row of electric bulbs which heat the spine during traction. There are loops for head and chin, and shoulder bars; but, instead of the foot-loops, there is a leather belt that encircles the waist or hips, to which is attached a long leather strap or a pair of straps that reaches from the motor-driven lever beyond the foot-end of the table. The motor is beneath the table top, on a shelf. When the belts, straps, and loops (or shoulder-bars) are adjusted as indicated, the motor is started by pressing a switch button. The lever draws the belt downward toward the feet, which places a traction upon the entire spine if the head and chin-loops are used, or upon the spine below the shoulders if the shoulder-bars are used. After a pull the lever returns toward the table, thus releasing the traction. There is a constant alternation of traction and release as long as the motor is running. The degree of traction may be adjusted from being barely noticeable to as pronounced a traction as one desires, by adjusting the strap attached to the waist band and lever. The heat from the electric bulbs aids very greatly in relaxing the muscles and ligaments of the spine, and also greatly increases the circulation in this region. The quiet hum of the motor, the rhythmic traction and release, and the relaxing warmth upon the spine, often put the patients to sleep.

Motor-driven Tractor

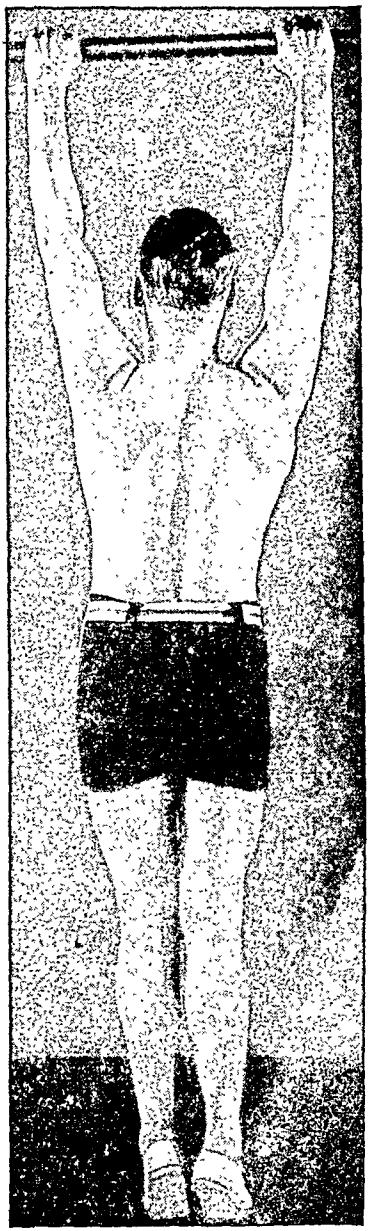
Spinal traction opens up the spaces between the vertebrae and permits the discs to receive more nutrition. Because the discs are closely attached to the vertebrae immediately above and below them, traction pulls upon the fibers of these discs and directly stretches them, tending to restore them to their normal thickness. Some people have gained from one to three or four inches in height by the regular use of traction, the gain being in increasing the thickness of these discs—which normally comprise about nine inches (one-fourth) of the average adult spine. Traction opens up the spinal circulation channels, permitting a better flow of nourishing blood to the

Effects of Spinal Traction

spinal cord, thus causing it to generate and transmit better and stronger nerve-impulses. Traction helps to restore the normal forward-backward curves in the spine so necessary to prevent irritating jars to the spinal cord and brain; it helps also to restore normal posture, and to elevate the ribs and make them more flexible—a condition necessary for full vigor. It stretches the muscles of the entire trunk, and the blood-vessels in these muscles, thus serving as a valuable exercise and as a means of securing better nutrition throughout the body. It makes possible more beneficial general exercise, by limbering up the spine. It often directly "adjusts" the spine, making spinal manipulation unnecessary by taking out one-sided tensions.

All persons who sit or stoop while working would greatly benefit by spinal traction. In fact, there is scarcely a person who would not receive some benefit from this simple and enjoyable treatment.

But spinal traction must not be overdone, and it is easy for many people to overdo it. Gentle traction only should be used at first, particularly if the spinal cartilages, ligaments, and muscles are much stiffened, contracted or weakened. Traction will benefit a spine having relaxed ligaments and muscles without tone, but gentle traction certainly must be used in such a case. If there is a hernia, or if the abdo-



General exercises for most forms of spinal curvature. Hang from a bar with both hands so that weight of body will pull the spine straight. Keep the trunk muscles relaxed, and hold the position until slightly fatigued; then stand for a moment and repeat the exercise by hanging from the bar.

Limitations of Spinal Traction

men or its contained organs are prolapsed, traction should not be used without a supporter, though in some cases of simple prolapse of abdominal organs, merely drawing in the abdomen during the traction will be sufficient to protect them.

Uses of Spinal Traction

Traction is not a panacea. It is not a cure-all, nor a cure at all for most conditions. But it is a valuable adjunct to other physiotherapeutic measures. It will produce some effects that cannot be otherwise obtained. It is excellent preparatory treatment for osteopathic and other spinal manipulations, or for moderate exercise. It is especially valuable for the person who works in an abnormal position several hours a day, or in such a position or at such work as to tire the back, for it takes the kinks out of the spine better than most other measures. It is good for anyone who is tired from the day's work, and is good for those who feel that "age is creeping on apace," and is used frequently in the treatment of muscular cramp and wry neck.

VIBROTHERAPY (VIBRATION).—Vibration has a definite field in the treatment of abnormal conditions. For more than a hundred years this therapeutic agent has been employed for various effects. Peter Henrik Ling, Swedish fencing master and founder of the most thorough and scientific system of curative gymnastics (born 1776, died 1839), was probably the first to apply vibration therapeutically. He and those who studied under him employed the hands for this purpose, and secured good results. Many masseurs and masseuses today employ hand vibration during their massage treatments. When properly given, this form of vibrotherapy is excellent. But it requires much time and attention to master the proper technique. Furthermore, it requires great endurance to continue manual vibration for a sufficient length of time to produce favorable results. Hence numerous mechanical appliances for producing vibration have been devised. These will be briefly mentioned later.

Ling and Vibro-therapy

Vibration: What It Is and Is Not

Vibration is a shaking, a to-and-fro movement. Yet it is not "merely" that. It is an oscillation, a thrill, a movement over very confined limits. Holding a hand or foot of a patient and moving it up and down as one would a pump-handle may have some value in certain conditions, but it is not vibration. Pressing down into the abdomen and releasing, no matter how

rapidly repeated, is not vibration. Vibration consists of an extremely fine tremor that reaches the deeper tissues of the patient, yet in a gentle manner, and the hands and arms and likewise the chest, shoulders, and back of the operator need to be in a state of tension or static contraction for the treatment. When mechanical vibrators are used, the best effects are usually produced by a fine tremor or thrill, though the larger the area to be treated the greater may be the stroke of each vibratory movement. Also, the greater the degree of covering of the bones, either by muscular or fatty tissue, the greater, as a rule, may be the strokes. Pain or the sensitiveness of the patient must be carefully considered in vibrotherapy, especially in mechanical vibrotherapy.

Direct Effects of Vibration

The chief effect of vibration is upon the circulation, the primary effect being contraction of the blood-vessels. This quickly gives way to dilation. The circulation becomes rapid instead of sluggish, warmth takes the place of coldness, and a tingling sensation, due to the renewed or increased flow of blood is often experienced. Because of this influence upon the circulation, and also because of the effect upon the nerves, fatigue of the muscles is usually quickly overcome.

Vibration and the Nervous System

As regards the nervous system, vibration reduces supersensibility, and hence certain abnormalities of sensation—paresthesias of different kinds—not due to inflammation and not aggravated by motion, are often relieved. (Paresthesia is an abnormal spontaneous sensation, such as a burning, pricking, or crawling.) The aches and other discomforts of fatigue are quickly dispelled. This accounts for the feeling of rest and the refreshing effect produced by vibration. The constant tired feeling so frequently present in neurasthenia, often a toxic fatigue, almost immediately disappears after vibration to the spine, though other therapeutic agents must, of course, be employed to overcome this symptom permanently. Headaches, sciatica, lumbago, and other neuralgias, heaviness in the head and a great variety of other neurasthenic symptoms yield to vibration, often more quickly than to almost any other form of treatment, except neuralgias, which usually are more quickly relieved by heat. The numerous disagreeable head symptoms often found in neurasthenia-constriction about or weight upon the head, giddiness, light-headedness, and so

forth—are often very promptly relieved, though in some cases they may be aggravated unless the vibration is very gentle. In paralytic disorders vibration is valuable, since it is a form of passive exercise, the active form being denied the patient.

Vibration and the Chest

The effect of vibration upon the chest, and of general vibration also, is to cause the respiratory movements to become deeper and fuller. This causes greater amounts of air and life-giving oxygen to be taken into the body and also causes more complete oxidation of food and body wastes. This further aids the circulation of the blood, and the supply to each organ of the body, and tends to increase the functional activity of these organs.

Vibration over the heart slows its action, but increases its force. This effect is so noticeable that the treatment has been called by some French doctors "gymnastic digitalis." But there is no untoward effect upon the heart from the vibratory treatment, when properly given for not too prolonged a period. The heart, when subnormal in tone, is toned up and strengthened by cardiac vibration.

Influence of Vibration upon Vital Organs

When applied over the abdomen, vibration has a pronounced influence upon the organs contained therein. The musculature of the stomach and intestines is toned up, bowel actions become more nearly normal, and the functions of the liver are aided. Digestion, absorption, and elimination are improved, hence nutrition is made more normal. Surplus fat may be removed to some extent in certain areas, though this is by no means the best method of accomplishing such reduction.

Fatigue and Vibration

When applied to the spine, there is almost immediate relief from fatigue resulting from walking or labor, a feeling of fitness and well-being that is very agreeable taking its place. Mental fatigue, brain-fag, poor concentration, mental laziness, and such conditions are likewise relieved by spinal vibration, with perhaps head vibration given in addition.

Dilation of the stomach, prolapse of the stomach or the intestines, pendulous abdomen, and other conditions resulting from loss of muscular, ligamentous, and nervous tone are improved by vibration. Spinal curvature is benefited because of the effect of vibration in relieving congestions and improving the tone of the muscles, and also because of its stimulating effect upon the nerve-centers. It is also recommended in the

treatment of cough, fainting, syncope, and belching of gas.

Vibration is excellent in conjunction with other measures for the preservation or improvement of beauty. It has a pronounced effect upon the scalp circulation, aiding in producing luxuriant, beautiful, lustrous hair. Falling hair and dandruff are more or less prevented. When properly used, vibration is excellent for facial massage, stimulating the circulation in the skin, and thus improving its texture and color, and the action of its glands. When overdone, it may produce relaxation of the muscles beneath the skin and make it more or less coarse; but when properly applied it is better than the much-talked-of operation of face-lifting.

Vibration and Beauty

As stated earlier, there are different forms of mechanical vibrators. The average person will not be likely to have any but the smallest and simplest kind. This is the small electric vibrator to be held in the hand and applied to any local area of the body. Several applicators are usually supplied, such as a hard ball, a flat rubber disc, a small vacuum cup of rubber, and a rubber disc with numerous projections, which fit into the vibrating mechanism. There are the larger vibrators designed for office practice, which may be placed on a pedestal or suspended from the wall or ceiling. These often have a hard-rubber twin prong for straddling the spinal vertebrae and for giving specific spinal percussion to the transverse processes of the vertebrae, as well as many other applicators for specific therapy. The hand vibrator that has a combined vertical and lateral stroke is to be preferred, these two motions have different effects; the vertical being stimulating, the lateral being soothing and even more valuable than the vertical stroke for increasing blood circulation.

Kinds of Vibrators

In addition to these, there is the massaging vibrator, of which there are several on the market. These are all electric. They produce their effects by means of eccentric discs or cams that revolve irregularly about a central axis, to which may be attached a web belt or a knotted wooden applicator (for abdominal or spinal vibration), or one may grasp special parts for hand and upper-body vibration. When the belt is used, it is placed about some part of the body, its two ends being attached to the two cams on the machine. As the cams work in opposite directions (on most of the machines) the belt is

Massage Vibrators

drawn for short distances across the part to which it is applied, and a massage vibration is produced. The stroke of the cams or levers may be lengthened or shortened to produce a vigorous or a mild movement of the belt. Soft, flabby and fat tissues may be appreciably toned by this treatment, the action being in some measure a substitute for exercise. When there is high blood-pressure or a diseased or weak heart, this oscillating vibrator serves as a very good substitute for exercise, or it may be used part of the time in conjunction with moderate exercises. The circulation of the blood is appreciably increased by this treatment. There are numerous other conditions in which this appliance may be used with good effect.

The Vibratory Chair

Another form of apparatus is the vibratory chair. This is a motor-driven arrangement, with an ordinary chair attached to the platform and the mechanism. It is provided with hand-holds, special attachments for the feet, an individual head-rest, and additional arrangements for grasping with the hands for vibration of the upper extremities. Hence one may, while seated in the chair, receive a vibratory treatment to the entire body, or one may so place oneself as to receive any local vibratory treatment. What has been said earlier regarding the effects of vibration apply to that produced by this chair.

The Mechanical Horse

Still another form of vibration is the mechanical horse. These appliances are ingeniously devised to simulate the different gaits of a horse. The movement may be made very moderate, or it may be made to resemble the trotting or galloping gait of a swift saddle-horse. There are up-and-down movements, the tilting movement, and, in fact, movements that simulate all those experienced in actual horseback riding. Since horseback riding is known to be one of the most beneficial of all exercises, because of the peculiar and, except by the mechanical horse, otherwise unobtainable, rocking, tilting, swaying motion of the hips and hip-spinal joints, this apparatus provides a most excellent type of exercise vibration. Its effects upon the spine, hips, intestines, liver, weight, digestion, metabolism, and nerves are very valuable. One who takes plenty of other forms of exercise will not need to use the mechanical horse, but those who for any reason do not exercise sufficiently, or whose exercise is not sufficiently "limbering," or who are becoming stiff, will profit greatly by

exercise on the mechanical horse. The same may be said regarding the vibratory massage or, rather, massage vibration, mentioned above. These appliances are somewhat expensive, and not many homes will be provided with them, but their cost would certainly not be as much as that of medical care and loss of time from business owing to illness that might have been avoided by suitable exercise. But many gymnasiums, clubs and treatment rooms are provided with these apparatuses and one may thus have the benefits of their use without being compelled to purchase them.

Vibration of General Benefit

Vibration, if properly given, and without overdosing, is beneficial to the whole body, but it should be emphasized that no form of vibration can be as effective as active exercise of the same parts of the body, for active exercise depends upon the voluntary effort of the individual taking it. It is especially in the treatment of the sick, and those below normal in health and strength, and perhaps of those who consider themselves too old or too sedate to exercise, that vibration is of the most decided value.

A precaution that should be emphasized in giving vibration, particularly to the spine, is that overstimulation brings relaxation, perhaps exhaustion, of the nerves and of the circulation generally. Hence vibrotherapy is a "two-edged sword," and should not be relied upon except as an adjunct to other therapeutic measures. That is, one should not get the impression that, if a little vibration is good for one, a great deal is better and consider as unnecessary many other valuable health measures. Vibration is at best but a help; it is not a cure-all,—in fact, it will cure nothing. But in the conditions where it is of value it has effects difficult to obtain by most other procedures. Use it if you desire, but use it moderately.

Theory of Zone-therapy

ZONE-THERAPY.—Many of you will recall having aborted a threatening sneeze by pressing the upper lip firmly against the teeth with a finger, pressing a finger tightly against the bridge of the nose, or by pressing a finger nail into the tip of the nose. When in the dentist's chair you grasp the chair arms with might and main or squeeze the interlaced fingers with equal zeal, or clench the hands as tightly as possible. When in pain or in anger we grind and grit our teeth and clench our hands, and perhaps also press the toes firmly

against the soles of our shoes. When we hit our shins or stub our toes or bump our heads, we immediately grasp the offended part and press firmly until the pain is more bearable. Colds have been aborted, dry coughs eased, croup relieved, by pressure against the back part of the tongue with a spoon handle. Hiccoughs have been checked by pulling strongly on the tongue. All these instinctive actions are natural ways of relieving pain or nerve-tension by producing some degree of anasthesia. Zone-therapy is also of some value in the treatment of coughs, cramps in the muscles and in headaches.

While an attempt has been made to classify the various pains and types of relieving pressure, and to divide the body *into zones, under the theory that pressure anywhere* within the zone would relieve pain within that zone, the theory of this therapy has not been definitely established. There is no complete explanation of the relation between the various types of pressure and the cessation of pain. It may be that the attention is merely withdrawn from the seat of pain or injury and centered, for the time, upon the point where pressure or stimulation is being given. Pain is further reduced, perhaps, by what has been called "nerve block," a condition in which the nerves affected become less capable of forwarding the impulse of pain to the headquarters of sensation. While some pathological conditions seem to be reduced by zone-therapy, it is generally impossible to secure more than temporary relief unless the existing pathological condition is removed, whether it be tumor, or some abnormal pressure or irritation, caused by pus accumulations, gas, impactions, etc.

Pressure as a Means of Deadening Pain

All sorts of simple instruments may be used by patients in pain for temporary relief. All sufferers know the relief of tightly clenching the nails into the palms of the hands. An aluminum comb tightly held does even better. The handle of a table-spoon may be used to press against the tongue for relief of pain in almost any part of the body. Patients in pain, especially women in childbirth, know the relief of pressing the feet against the foot of the bed. If the surface pressed against is rough—a serrated piece of metal fixed to a piece of wood, or the rough edge of a shallow box—the relief seems to be greater. Nurses also learn to stroke the backs of the hands of patients in pain. Sometimes the stroking is

Zone-therapy Appliances for Relieving Pain

more effective if the material or instrument used is rough.

The type of pressure which will relieve specific pains has to be worked out by the patient himself. Sufferers constantly hit upon devices which relieve them somewhat, independently of any knowledge of zone-therapy. Among the forms of relief possible are: the relief of abdominal pains by stroking the backs of the hands with a wire brush or metallic comb; relief of bladder pains by biting the tongue or the lips; relief of childbirth pains by firmly clenching something in the hands, and pressing with the feet against some rough resistant surface; relief of neuralgia by pressure upon the joints of fingers and thumbs in the zone of the pain, using rubber-bands or spring clothes-pins to produce the pressure, or pressure by fingers on the roof of the mouth.

Types of Pain Relieved by Zone-therapy

Zone-therapy is not a cure, primarily. It is a means of relieving pain which sometimes allows the patient to relax sufficiently to get the recuperation which enables the organic forces to overcome the local difficulty.